

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads

Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic
Approach (MPA) Regional Transport and Trade Facilitation Program -
Nepal Phase 1

**Upgrading of Butwal-Gorusinghe Road Section of East-West
Highway**



Environmental and Social Impact Assessment

January 2022

The photograph on the cover page shows the existing Butwal-Gorusinghe Roaection near Saljundhi

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List of Acronyms

amsl	Above mean sea level	HHs	Households
AP	Affected peoples	IPDP	Indigenous Peoples Development Plan
BBIN	Bangladesh-Bhutan-India Nepal	IPPF	Indigenous Peoples Planning Framework
BCDP	Building Code Development Project	IFC	International Finance Corporation
BOD	Biological Oxygen Demand	IIA	Indirect Impact Area
CBOs	Community Based Organizations	IP	Indigenous People
CDC	Compensation Determination Committee	KII	Key Informant Interviews
CC	Construction Contractor	LHF	Leasehold Forest
C-ESMP	Contractor's Environmental and Social Management Plan	LLR	Land and Land Resources
CF	Community Forests	LMP	Labour Management Procedure
CITES	Convention on International Trade of Endangered Species	MBT	Main Boundary Thrust (MBT),
Col	Corridor of Impact	MCT	Main Central Thrust
CSC	Construction Supervision Consultant	MFT	Main Frontal Thrust (MFT).
cums	Cubic meters	MoFE	Ministry of Forest and Environment
DAO	District Administration Office	MoPIT	Ministry of Physical Infrastructure and Transport
DBST	Double Bituminous Surface Treatment	MT	Mahabharat Thrust
DCC	District Coordination Committee	NDWQS	National Drinking Water Quality Standard
DCID	Development Cooperation Implementation Division	NEFIN	Nepal Federation of Indigenous Nationalities
DFO	District Forest Office	NEIC	National Earthquake Information Centre
DIA	Direct Impact Area	NGDC	National Geological Data Centre
DLR	District Land Revenue Office	NGO	Non-Government Organization
DNPWC	Department of National Parks and Wildlife Conservation	NNQSL	National Noise Quality Standard Limit
DO	Dissolved Oxygen	NOAA	National Oceanic and Atmospheric Administration
DoLOS	Department of Labour and Occupational Safety	NTFP	Non-Timber Forest Products
DoMG	Department of Mines and Geology	OSH	Occupational Safety and Health
DoR	Department of Roads	OSHA	Occupational Safety and Health Association
DoTM	Department of Transport Management	PA	Project Area
DPHO	District Public Health Office	PAF	Project Affected Families
DRO	Divisional Road Offices	PAP	Project Affected Persons
EA	Environmental Assessment	PCU	Project coordination Units
EHS	Environment Health and Safety	PGA	Peak Gravitational Acceleration
EPA	Environmental Protection Act	PMU	Project Management Unit
EAAA	Ecologically Appropriate Area of Analysis	RAP	Resettlement Action Plan
ESCP	Environmental and Social Commitment Plan	RM	Rural Municipality
ESIA	Environment and Social Impact Assessment	RoW	Right of Way
ESMP	Environmental and Social Management Plan	SC	Supervision Consultant
ESF	Environment and Social Framework	SDGs	Sustainable Development Goals

ESS	Environmental and Social Standard	SEP	Stakeholder Engagement Plan
FB	Footbridges	SPAF	Severely Project Affected Families
FGD	Focus Group Discussions	SRCTIP	Strategic Road Connectivity and Trade Improvement Project
FPIC	Free Prior Informed Consent	SRN	Strategic Road Network
GBV	Gender Based Violence	STI	Sexually Transmitted Infections
GESU	Geo-Environment and SocialUnit	TH	Tribhuvan Highway
G	Governmental Forest	IPPF	Indigenous People’s Planning Framework
GHG	Green House Gas	IPDP	Indigenous People’s Development Plan
GoN	Government of Nepal	WB	World Bank
GPN	Good Practice Note	ZOI	Zone of Influence
GRC	Grievance Redress Committee		
GRM	Grievance Redress Mechanism		
ha	Hectare		

EXECUTIVE SUMMARY

Introduction

The Government of Nepal is preparing the Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic Approach (MPA) Regional Transport and Trade Facilitation Program for World Bank financing, which is to be implemented in phases. The BBIN Nepal Phase 1 Project (the Project) is the first phase of the Program to support the more cost-efficient and resilient movement of goods and people within and across the borders of Nepal along the East-West Highway on the western side – which is key to accessing India's western seaports thus for economic growth. The Project has three components:

- **Component 1:** Systems to facilitate trade. This component will support the adoption and Implementation of Digital and Automated Systems to Facilitate Trade (a) Development of Automated System for Customs Data (ASYCUDA) new modules and (b) Development of an Automated Border Management System (ABMS).
- **Component 2:** Enhancing Regional Transport and Trade Enabling Infrastructure. This component will support (a) Upgrading of Butwal-Gorusinghe Road section and Gorusinghe-Chanauta Road section of East-West Highway from 2 to 4 lanes, (b) Construction of a signature bridge (including detailed design/urban design and construction), (c) Support for development and implementation of green resilient highway concept, integrating transportation functionality and ecological sustainability, and (d) Upgradation of trade facilities at critical locations.
- **Component 3:** Capacity building. The component will support in streamlining the policy environment for regional trade and cross-border movement of goods through (a) Implementation of the World Trade Organization (WTO) Trade Facilitation Agreement, (b) Transport specific reforms / Reforms to support local communities, and (c) Training programs and capacity building activities d. Project preparation studies.

Environmental and Social Risk and Impact Assessment Approaches of the Project

The Project is adopting an Environmental and Social Management Framework (ESMF) and subproject-specific Environmental and Social Impact Assessment (ESIA) for the screening, assessment and management of environmental and social impacts and risks of the project and subprojects. The ESMF, which is developed and disclosed separately, will be used to guide the screening, impact assessment and development of the environmental and social management measures (ESMP) of the yet to be defined and designed Gorusinghe-Chanauta Road section of the East-West Highway, the signature bridge and upgradation of facilities of land ports at important border crossings. During project implementation, the design details of these activities/subprojects are defined and prepared.

An ESIA (this ESIA) is prepared for the Butwal-Gorusinghe Road section of the East-West Highway based on the conceptual design to assess the environmental and social risks and impacts before execution of the project in accordance with the Government of Nepal's (GoN) requirements, World Bank's Environmental and Social Framework (ESF) and the Project ESMF.

Description of the Butwal-Gorusinghe Road Section of the East-West Highway

The Butwal-Gorusinghe (BG) road is located in the Rupandehi and Kapilbastu districts of Lumbini Province. The alignment begins at the Tinau bridge near Butwal. It passes through Batauli Bazar, Maina Bagar, Naya gaun, Belbas, Nayabasti, Bankatahawa, Murgiya, Rampur, Basgadi, Saljhandi, Pipra, Badgaun, Jitpur, Gorusinghe Baza., ending at Gorusinghe. The location of the road is shown in Figure E1.

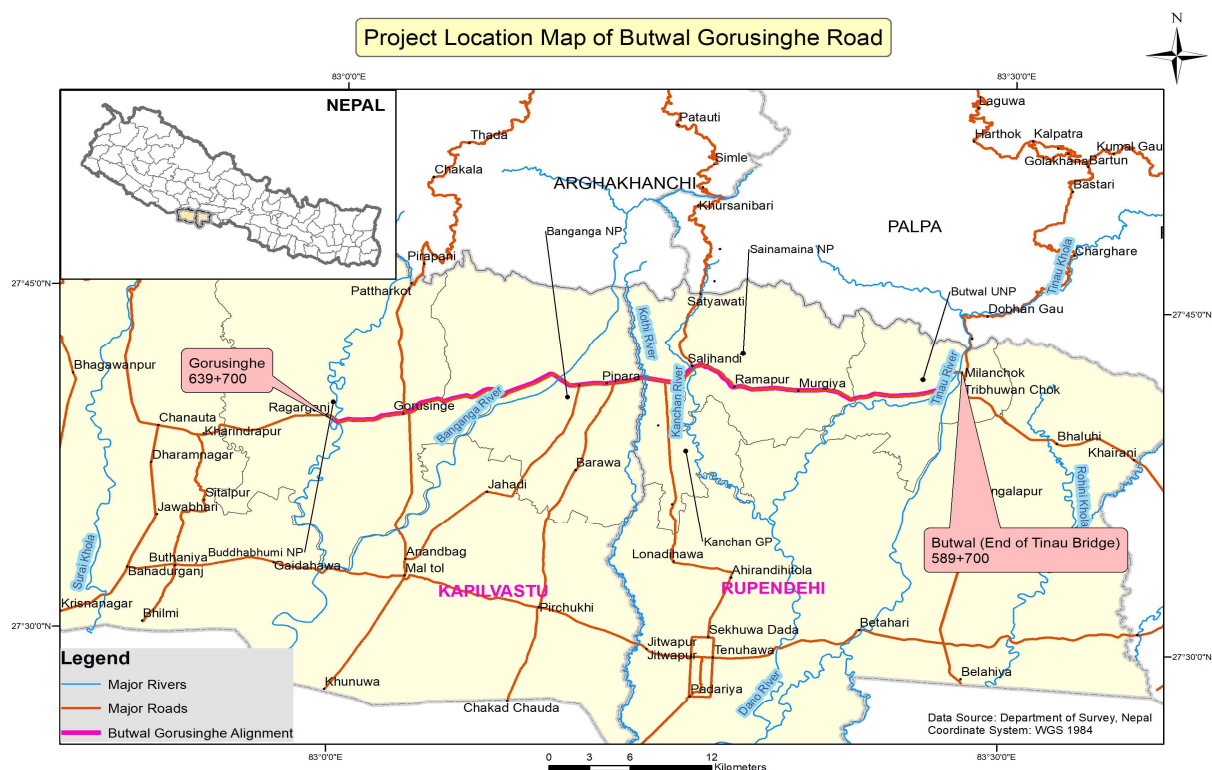


Figure E1: Location Map of BG Road

The existing 50—km long BG Road is a two-lane bituminous road with a 6 m carriage way and 1 m shoulder on both sides. The BG Road is one of the key sections of the East-West Highway, connecting many cross-border trade facilities with India. The current condition of the road is poor due to damages and cracks to the pavement with pot holes at many locations. The retaining walls in the initial section are also in poor condition. There are no road safety facilities, such as foot paths, pedestrian crossings, paved shoulders, road signs, crash barriers, etc.

Under the Project, BG Road will be upgraded from 2 lanes to 4 lanes with additional services roads (in 16.4 km urban and 10.8 km semi-urban areas), pedestrian sheds, footpaths and cycle lanes (in urban areas – 16.4 km). Thirty-one new bridges with lengths varying from 10 – 100m will also be constructed. Improving road safety will also be a key feature of BG Road improvement works and include installing signages and imposition of speed limits. The existing right of way (ROW) of the road is 50m, and the proposed works will be implemented within the available existing ROW and no additional land acquisition will be required, but four houses that have encroached the ROW will be relocated or compensated for. The salient features of the existing road and proposed road upgrading works is given in Table E1. A conceptual design of these upgrades are shown in Figure E2.

Table E1. Salient Features of the Existing BG Road and Proposed Upgrades

Features	Existing Road	Proposed Upgrades
Length	50 Km	50 km
Terrain	Plain (48.3 km), Rolling (2.6 km)	Plain (47.4 km), Rolling (1.7 km)
Right of Way	50 m	50 m
Total width (Road + service	7.50 m to 8.50m	• 24 m in non-urban (rural and forest) areas (total

Features	Existing Road	Proposed Upgrades
lanes + shoulders)		length: 22.68 km) • 33 m in semi-urban areas (10.76 km) • 50 m in urban areas (16.36 km)
Number of lanes	2	4 (each lane width 3.5 m)
Number of Additional Lanes for service roads	None	• None in non-urban areas • 2 (each width is 3.5m) urban and semi-urban areas (on both sides of shoulders)
Foot paths	None	• None in rural and semi-urban areas. • 2 (each width 2 m) in urban areas (on both sides of service roads)
Cycle lanes	None	• None in rural and semi-urban areas • 2 (width 2.3 m) in urban areas (on both sides of foot paths) –
Length of median	None	3 m width of the median along 50 km
Existing shoulders widths	0.50 m to 1.00m	2.5 m Paved shoulders
Number of bridges	31	31
Number of culverts	153	153
Length of retaining walls	112m	1500 m, approximately
Length of side drains	25 Km	70.44 km
Road safety improvements		Number of major villages/bazaars: 19 Number of major junctions: 4 Number of minor junctions: 12

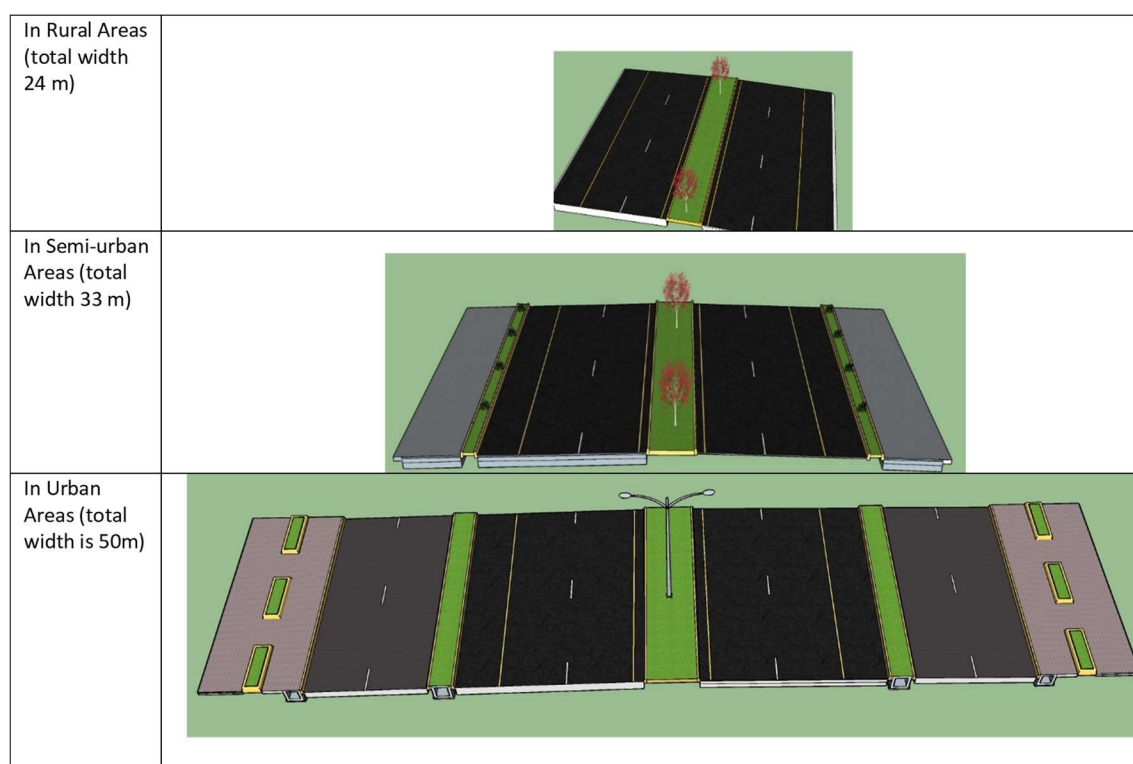


Figure E2: Conceptual Design of Proposed Improvements of BG Road

Scope of ESIA for the Butwal-Gorusinghe Road

This ESIA is for the BG Road to: i) establish the environment and social characteristics/baseline within the Corridor of Impact (a 300 m corridor, 150m on both sides of the center of the road, where there will be direct impacts) and Project Zone of Influence (a 2 km corridor, whether there could be indirect impacts); ii) assess potential adverse and positive environmental and social (E&S) risks and impacts due to the planned improvements under the project during its entire cycle, that is, from preconstruction to construction, operation and maintenance; iii) consider all Environment, Social, Health and Safety (ESHS) risks and impacts likely in the BG road improvement works; and to propose measures to address all environmental and social impacts of the road improvement. The ESMP proposed in this ESIA study will be complemented by key social management plans such as the Stakeholder Engagement Plan (SEP), Labour Management Procedure (LMP), Gender-Based Violence (GBV) Risk Mitigation Action Plan for the BG Road.

Legal and Institutional Framework

Nepal's national legislative framework, WB Environmental and Social Framework (ESF) and Environment Health and Safety Guidelines (EHSGs), form the legal and institutional framework for this ESIA. This section of the ESIA provides an overview of the applicable environmental and social policies, legislative and institutional frameworks, which the project must comply with during its implementation. The national legal and institutional framework is based on the Constitution of Nepal (2015), which provides the right of everybody to live in a clean and healthy environment and conserve, promote and make sustainable use of natural resources. A detailed analysis of the existing legislative framework in Nepal was undertaken, which included a review of all relevant documents such as development plans, strategies, policies, acts and rules. The national directives, guidelines, manuals, and standards help fulfill the regulatory framework requirements, providing useful, practical tools applicable at the level of project implementation.

The existing regulatory framework was analyzed and tabulated, highlighting relevant key provisions to the BG Road ESIA. Some of the important laws and regulations reviewed included (but were not limited to) the following: The Road Safety Action Plan (2013-2020), Nepal National Biodiversity Action Plan (2014-2020), Nepal National Environment Policy (2019), Forest Policy (2015), Labour Policy (2005), Land Acquisition, Resettlement and Rehabilitation Policy (2015), Environment Protection Act (2019), Forest Act (2019), Control of International Trade of Endangered Wild Fauna and Flora Act (2017), Labour Act (2017), Child Labour (Prohibition and Regulation) Act (2000), and Land Acquisition Act (1977) with amendments, Labour Rules (2018), Water Resources Regulation (1993), Industrial Policy (2010). Being a signatory party for many international conventions and other treaties, Nepal is bound to address the vital environmental and social issues transboundary or global in nature, such as pollution, climate change, and biodiversity conservation. The provisions of national regulatory framework have been taken into account during the ESIA process, in addition to the World Bank ESF and EHSGs.

Baseline Environmental and Social Conditions

The baseline data was collected from August 2020 to January 2021 for key environmental attributes like physiography, drainage, geology, soil, hydrogeology, land use, flora, fauna, forest/vegetation cover, climate, ambient air quality, water quality, ambient noise levels, hazards and vulnerability. It also collected social attributes such as socio-economic characteristics of affected households, cultural heritage, public utilities, Indigenous People (IPs), vulnerable groups, project-affected groups and gender.

Physical Environment:

The BG Road mainly lies within the Terai region, with an elevation of 117 to 158m amsl (above mean sea level). The first 1.7 km of the alignment lies close to the foothills of Siwalik hills. The existing land use patterns along the BG road alignment are predominantly built-up areas (61%), followed by forests (21%),

farmlands (16%), and remaining are water bodies. The land use map of the BG Road is shown in Figure E2. The road lies in a tropical and sub-tropical climate with humid and hot characteristics. In general, the rainy season (monsoon) starts in June and ends in September. About 80% of the rainfall occurs in this season. The average minimum temperature of Kapilbastu is 18.79°C, and the maximum temperature is 30.93°C. Most of the major rivers in the project area originate from Siwalik and Mahabharat hills. Some of these rivers are prone to flash floods during the monsoon but dry during the remaining seasons. The road alignment falls on the sediment of the Gangetic Plain (Upper Terai) and rocks of the Siwalik Group of western Nepal. The first 1.7 km of the alignment falls foothills of Siwalik, and the remaining covers the sediments of the Gangetic Plain. Landslide, gully erosion and old slide scarp are observed in the initial one-kilometre section of the BG Road.

The air quality, monitored in nine locations, showed that the PM_{2.5} exceeds the National Ambient Air Quality Standard (NAAQS) except in the forest area. The average 24 hours noise level varies from 30.1dB(A) to 129.1 dB(A). The maximum noise level is recorded in Butwal, and a minimum is in Forest Area. The noise levels at Butwal exceeded National Noise Quality Standard Limit (NNQSL) and World Bank EHS standards. In terms of drinking water quality, all the parameters are within the permissible standard value of the Nepal Drinking Water Quality Standard (NDWQS).

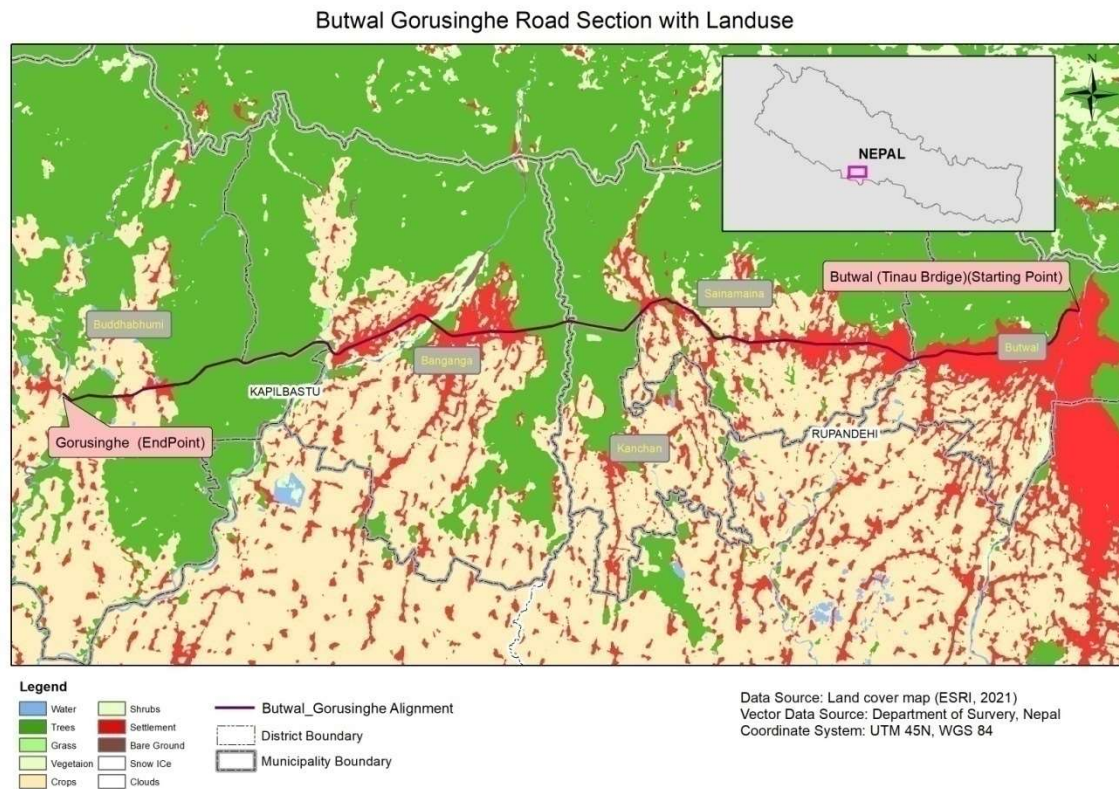


Figure E2: Landuse Map along BG Road

Biological environment:

About 15.4 km of the BG road alignment passes through the forest dominated by *Shorea robusta* (Sal) forest and patches of *Dalbergia-Acacia* forest along the riverine sections. There are three major forest

areas crossing the BG Road (see Figure E2), and they are (i) from the chainage¹ KM 611+870 to KM 617+730 (Saljhandi-Pipara Forest block and length of the road section in this forest is 5860m) (ii) KM 626+970 to KM 635+200 (Gorusinghe Forest block and length of the road section is 8230m), and (iii) KM 637+720 to KM 639+000 (Badhare/Budhi Forest block and length of the road in this section is 1280m). These forests are predominantly (>80%) community forests used for multiple purposes, including community use and production for timber, firewood and fodder. The forests located within 50m RoW (25m from the center of the existing road to both sides) are owned by DoR and are already disturbed and degraded. There are no nationally or internationally designated protected areas, including identified wildlife migration corridors within the corridor of impact and project zone of influence.

The field survey, interviews with the local experts and literature review indicated the presence of three critically endangered bird species, one endangered bird species, one critically endangered amphibian, and three endangered amphibian species within the Project zone of influence. However, considering (i) critical habitat screening applying IFC PS6 thresholds indicated that these CR and EN species are widely distributed in South East Asia and South Asia (the Himalayas and in Nepal), (ii) no nationally and internationally designated protected areas close to the project site (the nearest protected area is located at about 50 km from the BG road and the nearest key biodiversity area is located about 10 km from the road), (iii) limited area of Ecologically Appropriate Area of Analysis (1 km either side of the BG Road), (iv) the proposed works will be carried out within the existing ROW – it is unlikely that there are critical habitats in the project zone of influence of BG road, and the improvements of Butwal – Gorusinghe section are not expected to affect the global population of these species.

Socio-economic and Cultural environment:

The project area covers Rupandehi and Kapilbastu districts and lies in Butwal metropolitan, Sainamaina, Banganga and Buddhabhumi municipalities, and Kanchan rural municipality. The caste and ethnic groups found in the project area are Brahmin, Chhetri, Dalit, Muslims, Madheshi and Janajatis. In the project area, there are five IP groups, namely Newar, Gurung, Magar, Rai and Chaudhari(Tharu), but they live as part of the mainstream local communities and have no collective attachment to the land in the project area. The total population of the influence area, covering 22 wards, is 144914. Out of this population, males and females are 68232 and 76652, respectively. Some sections of the right of way are encroached by 108 households, including households of 27 indigenous peoples (IPs) for the setting-up of businesses and building houses. These IPs have moved into the RoW to set up businesses, and do not have an affiliation to the land within the ROW. The total population of the project-affected households is 495 and the average family size is 4.6.

Stakeholder Engagement and Public Consultation

Stakeholder engagement is an inclusive process to engage stakeholders throughout the project lifecycle. ESS10 Stakeholder Engagement and Information Disclosure recognize the voice of different stakeholders. Stakeholder consultations carried out during ESIA preparation address the issues of project affected, other and interested parties and vulnerable and marginalized groups. The project affected parties are the parties that are directly affected by the project activities and located within the corridor of impact, and they include households that have encroached into the ROW, local population, public service providers, and local health facilities. The other interested parties are local governments (1 Sub-metropolitan City, 3 Municipalities and 1 Rural Municipality), local non-governmental organizations (NGOs), civil society, teachers, political leaders, women groups, local entrepreneurs, local user groups (forest, water, irrigation

¹ The starting chainage of the road is KM 589+700 (this chainage is referenced to the East West Highway) and ends at KM 639+700.

etc.), security personnel (traffic police and army), drivers and road users (including travellers); and vulnerable and marginalized groups, including those who are differently-abled.

Consultations were held with all the above stakeholders to share the project information and to document and incorporate their initial feedback in the project concept and the environmental and social concerns related to the concept. Initial walkover surveys were carried out, followed by individual interviews with local government officials. The tools such as Focus Group Discussions (FGD) and Key Informant Interviews (KII) were used to conduct discussions. 27 Consultation meetings at different municipalities/RM offices of Rupandehi and Kapilbastu district during December 2021 and January 2022 were taken place. 442 participants took part, comprising 332 males and 110 females, in these consultations. Additional consultations with the specific groups such as the department of forest, forest users group, women, affected people, other interested parties were carried out.

The key issues raised by the stakeholders during consultations are: compensation for affected private and public structures and utilities; air pollution, construction of foot over bridges in the settlement area, skill development and employment opportunities to local people, protection from landslide areas, additional side drain and cross drainage facilities, ownership of harvested trees should be granted to respective forest user groups, roadside plantation, fence in community forest area along roadside should be reconstructed; and stakeholder engagement during road upgrading works.

Environmental and Social Risks and Impacts

Beneficial impacts from the BG Road improvement include facilitated economic development, covering the generation of employment and arising opportunities for businesses, access to services and markets, improved road infrastructure contributing to safety issues and better transportation. Beneficial impacts are related to the improvement of road infrastructure and its technical efficiency, economic development and livelihoods of the local people.

All impacts were categorized in terms of their magnitude and significance. The following sections summarize the environmental and social risks and impacts of the BG road improvement works by each relevant environmental and social standard.

Assessment and Management of Environmental and Social Risks and Impacts (ESS1): The widening and improvements of BG Road from 2 lanes to 4 lanes will be carried out within the existing RoW. However, some sections of the ROW have been encroached with residential and commercial structures, and they will be partially affected by the widening works. Further, the widening will require the clearing of 28 acres of forest land within ROW which is already owned by DoR. The proposed works will partially affect 99 private structures, mainly their front porches (*verandas*), including 65 commercial structures affecting the livelihood of these households. Among these affected households, 23 households belong to IPs due to their encroachment into the ROW, therefore this impact on IPs do not warrant free, prior and informed consent (FPIC) in this circumstance. Further, 4 residences one business will be fully affected and need to be relocated. Impacts during construction mainly relate to dust and noise pollution, increased risk to health and safety of workers and communities, increased traffic flow and traffic-related accidents and social issues related to resettlement and livelihood impacts, labor influx impacts such as sexual exploitation and abuse sexual harassment (SEA/SH), communicable diseases and child/forced labor, all anticipated during construction. The improvements of BG Road is also assessed to have no significant cumulative impacts as works are mainly confined within the existing ROW and in an area that has already been altered, fragmented and highly disturbed for many decades as a result of human population growth, encroachment and establishment of new settlements along the highway, land transformation, agriculture development and other associated development as seen in the landuse map presented in Figure E2. With or without improvement works in BG Road, land-use change and land transformation have already taken

place and will continue to take place as a result of other factors such as urbanization and development of rural areas resulting from increase federalization and decentralization of development in the provinces. In addition, the surrounding rural roads have been constructed in recent years, often without any environmental and social assessment and mitigation measures. Increased density of the road networks and lack of protective measures have aggravated the adverse impacts on the environment that have already taken place, such as siltation and sedimentation of rivers, the threat of poor water drainage and community health and safety. The impacts might be exacerbated by climate change and the uncoordinated development of local communities, which may cause significant economic losses.

Labour and Working Conditions (ESS2): The BG Road project is expected to involve direct, contracted and Primary supply workers. The project will employ about 500 direct and contracted workers, who may be exposed to risks such as poor conditions in labor camps, non-payment of wages or other benefits, discrimination in employment, child labour or forced labour, occupational health and safety (OHS) issues including workplace accidents, grievances related to workers and SEA/SH. The contracted workers are more susceptible to such risks. The project will employ about 500 to 600 workers, and about 40% of workers will be hired from local communities. A labor grievance mechanism will be established for the workers as part of the LMP.

Resource Efficiency and Pollution Prevention Management (ESS3): ESS3 refers to several risks and impacts, including landscape aesthetic, air and noise pollution, potential hazards and solid waste management, and pollution of water sources. The project's impacts and risks would be of significance on sensitive receptors due to waste disposal; slope stability and erosion; blocking of seasonal streams during cross drainage construction; stressing water sources used by the community; emission from construction vehicles, equipment and plants; dust from earthworks, cutting, stack yard, transportation of materials, noise pollution and settlements along road; damage to structure vibration from movement of machine and equipment; handling of hazardous and non-hazardous wastes, quarry and borrow area. All these impacts are more prominent during the construction stage and can be managed through generic and specific measures described in the mitigation chapter according to national standards for air, noise and water quality as well as through best practices applicable to road construction projects.

Community Health and Safety (ESS4): During construction, transporting construction materials may cause nuisances and health and safety risks to the local communities. Project activities such as hill cutting (about 1 km length), road excavation, and the use of vibration equipment might result in landslides and dust pollution. The stockpiling of construction materials debris generated during construction may disturb the landscape and cultivated lands and contaminate the water bodies. Impacts on existing traffic are likely with the construction activities, plying of construction vehicles, and storage of construction materials in proximity to the existing highway. The presence of an outside labour force in the project area may cause negative impacts on the environment and local communities and should be managed to prevent conflict situations, including SEA/SH. The project area lacks a well-defined and coordinated response mechanism. SEA/SH risks associated with labour influx indicate a 'substantial' level of SEA/SH risk. Furthermore, a lack of institutional and infrastructural capacity of the GBV service providers may result in inadequate responses to GBV survivors. Further, risks associated with labour influx and increased mobility of outsiders may aggravate the spreading of infectious diseases, including COVID 19, HIV/AIDS and STIs. A stand-alone SEA/SH Action Plan is being prepared to manage risks related to SEA/SH associated with labor influx.

Land Acquisition, Restrictions of Land Use and Involuntary Resettlement (ESS5): In total, 103 structures belonging to 108 households (HHs) will be affected due to encroachment within the existing right of way. No new land acquisition is required for the project. Out of the 108 total projects affected HHs, 43 households will lose parts, i.e. verandas and pouches, of residence only, 48 HHs will lose residence plus small business structures, and 17 HHs will lose business structures only. Of the 108 project-affected

households, only 4 structures are fully affected along the alignment. Among the total affected households, 23 are IPs (due to encroachment into the ROW), 8 are Muslims and 3 are from Dalit. The project will affect 162 public structures (19 temples, 68 Resting place, 61 *chautaro*, 2 public toilets). Further, 1646 electric poles and 46 drinking water taps will require relocation. Construction-related impacts will be avoided through design to avoid and minimize impacts; and to compensate for residual impacts before commencement of construction works as per the procedures outlined in the Resettlement Action Plan (RAP) for the Butwal-Gorusinghe Road project.

Biodiversity Conservation and Sustainable Management of Living Natural Resources (ESS6): The habitats in the existing ROW and surrounding areas of the BG Road are largely modified, and patches of natural habitats, which already fragmented, and anthropogenic pressure on the area is very prevalent due to its long history of development and human settlements. The field survey, interviews with the local experts and literature review indicated the presence of three critically endangered bird species, one endangered bird species, one critically endangered amphibian, and three endangered amphibian species within the Project zone of influence. However, considering (i) critical habitat screening applying IFC PS6 thresholds indicated that these CR and EN species are widely distributed in South East Asia and South Asia (the Himalayas and in Nepal), (ii) no nationally and internationally designated protected areas close to the project site (the nearest protected area is located at about 50 km from the BG road and the nearest key biodiversity area is located about 10 km from the road), (iii) limited area of Ecologically Appropriate Area of Analysis (1 km either side of the BG Road), (iv) the proposed works will be carried out within the existing ROW – it is unlikely that there are critical habitats in the project zone of influence of BG road, and the improvements of Butwal – Gorusinghe section are not expected to affect the global population of these species. The ESIA further indicated that the improvement of the existing BG would affect a total of 28 hectares of forest within RoW along 15.2 km of its length. The direct impact involves the cutting of 9386 trees, including 2255 saplings, 1691 poles, and 5511 matured trees. Among them 7,109 are forest trees and none of these trees are threatened species. The physical work within the ROW will not adversely impact critical habitats. In addition, there are also no protected areas, wildlife reserves or migratory wildlife corridors along the BG road. Nevertheless, for every tree that will be cut, the project will replant 10 trees in an area designated by the Forest Department to meet the requirement of the GoN.

Indigenous People (ESS7): There are 5 indigenous peoples (IP) groups in the project area, namely Newar, Gurung, Magar, Rai and Chaudhari (Tharu), living as part of the mainstream local communities with no collective attachment to land. A total of 23 IPs households will lose parts of their structures and are affected due to encroaching the RoW. These IP community will not lose their private land because their structures are constructed within the RoW and these structures will be and partially affected. The project will not cause any direct impact to their land, will not need complete relocation of any of the IP communities, and will not cause impacts to the cultural heritage of the IP communities. These IP communities' potential impacts and risks are related to labour influx, GBV, traffic safety, air and water quality deterioration during construction, etc. Therefore, according to the requirements of free, prior and informed consent (FPIC) under ESS7, FPIC is not required under this project component. Resettlement related IP issues will be addressed as part of the RAP.

Cultural Heritage (ESS-8): ESS8 sets out general provisions on risks and impacts to tangible and intangible cultural heritage. During the ESIA, no archeologically and historically tangible heritages such as monasteries or ancient monuments were found along the road alignment, and there will be no impacts on tangible or intangible cultural heritage. There are 19 small temples/shrines within the ROW, as advised during stakeholder consultations, are not of cultural importance or significance. They will be relocated to the nearby public land in consultation with the respective families along the right of way. A Chance-finds procedure has been included in the Environmental and Social Management Plan (ESMP), which will be followed if, during construction, there are any chance finds. The chance find procedures will also be

included in the bidding documents, in the contractor contract and in the contractor's ESMP (C-ESMP). The stakeholder engagement activities under the project will be leveraged to further identify and manage other cultural heritage sites and artifacts throughout the project life.

Financial Intermediaries (ESS 9): Since no financial intermediary is involved in this project, ESS9 is not applicable.

Stakeholder Engagement and Information Disclosure (ESS 10): During stakeholder consultations, the issues raised by communities included: adequate compensation for affected land; affected private and public structures and utilities; air pollution, construction of foot over bridges in the settlement area, skill development and employment opportunities to local people, landslide area need to protect, additional side drains and cross drainage facilities, ownership of harvested trees should be granted to respective forest user groups, roadside plantation, and construction of fences along the road in community forest areas. A standalone Stakeholder Engagement Plan (SEP) with a project-level GRM is being prepared.

Environmental and Social Management Measures

The major management measures in line with ESSs have been given below.

Cooperation and information dissemination about the project amongst project affected, other interested stakeholders and vulnerable and marginalized groups will help to execute all mitigation measures. The project will coordinate with local bodies and concerned stakeholders for the planning of local development.

An Environmental and Social Management Plan (ESMP) applying the mitigation hierarchy has been prepared to manage the project's environmental and social risks and impacts. It includes generic and site-specific mitigation measures, a monitoring plan, capacity building, responsibilities and reporting system and environmental and social costs. In addition, the ESMP provides measures to address SEA/SH issues at a project level. These measures will be further elaborated in a standalone SEA/SH action plan. The key issues regarding labour will be managed in compliance with National Labour Act, 2017 and Labour Rules, 2018 and WB ESF, 2018 through a comprehensive LMP and Occupational Health and Safety Plan (OHSP). A GRM will be provided for project workers to help workers to lodge grievances and to manage the resolution of worker-related grievances. A Worker Camp Operation Plan and Worker's Code of Conduct will be prepared, which will also discourage or minimize SEA/SH.

A separate RAP will be prepared to address physical and economic displacement resulting from project activities. All losses (private and public assets) will be compensated with replacement costs as per the Entitlement Matrix. For any additional impacts occurring during project implementation, a resettlement framework has been prepared and will be applied for the additional losses. The ESMP obligates the contractor, upon mobilization, to prepare the Contractor's ESMP (C-ESMP), which shall be prepared prior to the commencement of construction activities. The C-ESMP shall include an OHS plan, Water and Waste Management Plan, Labor Influx Management Plan, Workers camp management plan, Traffic management and road safety management plans, Quarry/borrow area management plan, and Site Restoration Plan among others in accordance with the GoN and IFC&WB workers' accommodation guidelines.

A Stakeholder Engagement Plan (SEP) is being developed for the project to identify stakeholders and to provide a plan for engaging with stakeholders throughout the project lifecycle. The SEP will provide materials for community awareness and sensitization with emphasis on women and young girls, promoting health seeking behaviour. The SEP includes details of a project level GRM for stakeholders to raise any questions and grievances.

Mitigation measures for general risks and impacts: Mitigation measures for general risks and impacts include: an erosion control plan with bioengineering and reinforcement structures; restoration of affected

landscapes; development of a stockpiling and excavation management plan; recommendations for fuel-efficient machinery and carbon offset by compensatory plantation; proper relocation and restoration of all affected utilities taking the community into confidence with meaningful consultation; enforcement and control of anti-poaching regulations; establishing speed limit signs in appropriate locations; providing awareness to drivers; establishing a grievance redress mechanisms (GRM) for complaints; providing workers transportation to and from the project sites; adopting safety measures for workers such as shinning jackets (aprons), boots, gloves, and helmets; compliance with the labour laws; establishment of Worker Camp Operations Guidelines; development of a Hazardous Materials Management Plan to manage hazardous material use, storage, transport, and disposal; development a Water Quality Management Plan; community awareness and sensitization with an emphasis on women and young girls; chemical management plan prior to construction including handling and disposal of hazardous chemical and waste. No tangible or intangible, or archaeologically important cultural heritage will be impacted.

Site-specific mitigation measures: Site-specific mitigation measures include traffic management provisions for construction sites and slope protection work (Civil engineering and Bio-engineering works). Air and Noise Quality monitoring, Water quality monitoring and Water Sprinkling will be done in dust-prone areas to reduce dust. Cross drainage structures (such as box culvert, new bridges, side drain) will be provided to reduce water logging flooding in the project area. Installation of traffic signs, road safety signs, crash barriers, pedestrian crossings/overhead for road safety. For flood protection, river training works will be implemented. Compensatory tree plantation, sign board, speed limit, display boards in forest areas will be placed in required locations for wildlife crossings. Installation of fencing and culvert/underpass at specific locations for wildlife protection and prevention of road kills in the forest areas are also proposed. Relocation of public utilities (Drinking water supply lines, electric poles, irrigation canal etc.), restoration of damaged community infrastructures, Safety Equipment (PPEs) and actives for additional Pandemic (COVID_19) safety measures are provided in the mitigation cost. Cost for Insurance of labours, reinstate of quarry borrow pit, batching plants, camp etc., are provided in the mitigation costs.

Key Measures and Actions for the Environmental and Social Commitment Plan (ESCP)

The ESCP identifies measures and actions to meet ESS requirements. These include the development of a SEP, LMP, and RAP identified to be required for the BG Road project. The Ministry of Physical Infrastructure and Transport (MoPIT) is responsible for compliance with all requirements of the ESCP during the implementation of specific measures and actions is conducted and implemented by the DoR-Development Cooperation Implementation Division (DCID).

Implementation of the material measures and actions set out in the ESCP, will be monitored and reported to the Bank by DoR as specified in the ESCP. The World Bank will monitor and assess the progress and completion of the material measures and actions throughout the implementation of the project. If required, the ESCP may be revised and updated during project implementation to reflect adaptive management of project changes and unforeseen circumstances or in response to the assessment of project performance conducted under the ESCP itself.

Institutional Arrangements

DoR under MoPIT is the key implementing agency for development and implementation of strategic road projects (Government/Donor funded). DoR has five deputy directorates/branches that develop and implement projects. To facilitate field implementation, DoR maintains 30 Divisional Road Offices (DROs). The DCID is one of the key directorates undertaking all donor-funded projects. Project Management Unit (PMU) under DCID prepare Initial Environmental Examination (IEEs), ESIA, RAPs/IPDPs and perform other E&S risk management. A PCU will be created to manage this project.

DoR's Geo-Environment and Social Unit (GESU) is the focal point for the E&S risk management and monitoring unit at DoR. GESU undertakes compliance monitoring and review of IEEs, ESIAs, RAPs and IPDPs for government/donor-funded projects. MoPIT is the governing agency mandated by the Environmental Protection Act (EPA) to review and approve IEEs for projects in the transport sector. It also reviews and endorses ESIA reports for review and approval by the Ministry of Forest and Environment (MoFE). The EIA Unit under MoFE undertakes the review and approves EIAs.

Other institutions such as the Department of Forestry and Soil Conservation (DoFSC)/Divisional Forest Office, the Department of Labour and Occupational Safety (DoLOS), and project-affected M/RM also support the project implementation.

Contractors and sub-contractors will be required to comply with the ESMP and related plans, which will be spelled out in bidding documents, work contracts and in the ESCP of DoR.

Training and capacity building of DoR and agencies involved in project implementation to manage environmental and social risks and impacts will be supported by the project under the institutional strengthening component.

कार्यकारी सारांश (बुटवल-गोरुसिंधे सडक)

परिचय

नेपाल सरकारले विश्व बैंकको ऋण सहयोग बाट बंगलादेश भुटान भारत नेपाल, बहुचरणीय कार्यक्रममात्मक दृष्टिकोण क्षेत्रीय सडक तथा व्यापार सहजीकरण अन्तर्गत पहिलो चरणको (आयोजना) कार्यान्वयन गर्नका लागि तयारी गरिराखेको छ। यस आयोजनाको मुख्य उद्देश्य पूर्व-पश्चिम राजमार्गको पश्चिम सिमाना तर्फको वारिपारी व्यापार पारवाहन साथै मानिसहरुको सहज आवत जावतको लागि न्यून लागतमा अधिक प्रतिफल उपलब्ध गराउनुको साथै भारतका पश्चिम तटीय बन्दरगाहहरुमा सहज पहुँच पुऱ्याई मूलुकको आर्थिक वृद्धि र विकासमा टेवा पुऱ्याउनु रहेको छ।

यस आयोजनाका ३ घटकहरु रहेका छन्।

घटक १: व्यापार सहजीकरण प्रणाली: यस घटक अन्तर्गत व्यापारलाई सहजीकरण गरि सीमा व्यवस्थापन गर्न डिजिटल र स्वचालित प्रणालीहरुको प्रयोग गरिने छ। (क) भन्सार तथ्याङ्क व्यवस्थापन प्रयोजनको लागि नयाँ मोड्युलको स्वचालित प्रणालीको विकास गर्नु। (ख) स्वचालित सीमा व्यवस्थापन प्रणालीको विकास गरि समावेश गर्नु।

घटक २: क्षेत्रीय यातायात र व्यापार पूर्वाधारको वृद्धि गर्दै सुधार गर्नु: (क) पूर्व-पश्चिम राजमार्ग अन्तर्गतको बुटवल-गोरुसिंधे-चनौटा खण्डलाई हालको २ लेनबाट ४ लेनमा स्तरोन्नती गरिने। (ख) तिनाउ पुलको निर्माण (विस्तृत डिजाइन/शहरी डिजाइन तथा निर्माण)। (ग) यातायात कार्यक्षमता र पारिस्थिक दिगोपन (ecological sustainability) लाई मध्यनजर गरि हरित मैत्री राजमार्ग निर्माण गर्ने अवधारणाको कार्यान्वयनको लागि सहयोग गरिने। (घ) संवेदनशील तथा महत्वपूर्ण स्थानमा व्यापार सुविधाहरुको स्तरोन्नती गरिने।

घटक ३: यस घटक अन्तर्गत क्षेत्रीय तथा सीमा पारवाहन सम्बन्धी नितीहरुलाई सुव्यवस्थित गर्दै (क) विश्व व्यापार संगठनको व्यापार सहजिकरण सम्झौताको कार्यान्वयन तथा सुधार (ख) स्थानीय समुदायलाई सहयोग पुग्ने गरि यातायात क्षेत्रको सुधार (ग) तालिम तथा क्षमता अभिवृद्धि (घ) आयोजना तयारीका लागि अध्ययन।

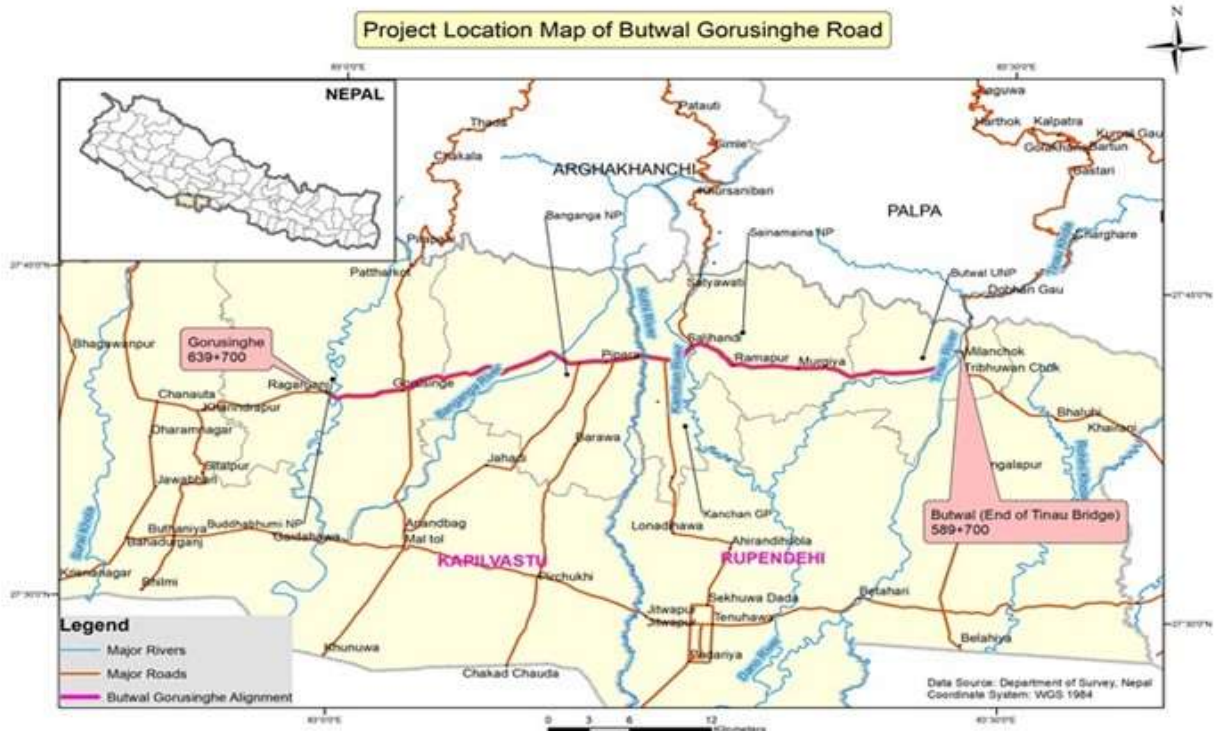
आयोजनाको वातावरणीय र सामाजिक जोखिम र प्रभाव मुल्याङ्कन दृष्टिकोण

यस आयोजनाले, आयोजना र उपआयोजनाहरुको लागि वातावरणीय र सामाजिक प्रभावहरु र जोखिमहरुको प्रारम्भिक मुल्याङ्कन (screening), वातावरणीय र सामाजिक व्यवस्थापन रुपरेखा (ESMF) र आयोजना विशेष वातावरणीय र सामाजिक प्रभाव मुल्याङ्कन (ESIA) प्रतिवेदनहरु अनुसरण गरेको छ। आयोजनाले ESMF छुट्टै तयार गरि खुलासा गरिसकिएको छ र उक्त ESMF ले गोरुसिंधे-चनौटा सडक खण्ड अन्तर्गत परिभाषित र डिजाइन हुन बाँकी रहेका घटकहरु जस्तै: तिनाउ खोलाको पुल (Tinau signature bridge) र महत्वपूर्ण सीमा नाकाहरुमा स्थल बन्दरगाहहरुको सुविधाको स्तरोन्नति इत्यादि परिभाषित भई डिजाइन विवरणहरु तयार भए पश्चात उक्त गतिविधीहरुको प्रारम्भिक वातावरणीय तथा सामाजिक मुल्याङ्कन (screening) तथा वातावरण तथा सामाजिक प्रभाव मुल्याङ्कन (ESIA) लगायत प्रभाव व्यवस्थापन (ESMP) प्रतिवेदन तयारीको लागि मार्गदर्शन गर्न प्रयोग गरिने छ।

यो ESIA बुटवल-गोरुसिंधे सडक खण्डको विस्तृत आयोजना डिजाइन तथा अध्ययन चरणमा अपनाईएको अवधारणात्मक डिजाइनमा आधारित रहि नेपाल सरकार, विश्व बैंकको वातावरणीय र सामाजिक रुपरेखा (ESF) र आयोजनाको ESMF मा उल्लेखित प्रावधानहरुलाई अनुसरण गरि तयार गरिएको छ।

पूर्व-पश्चिम राजमार्गको बुटवल-गोरुसिंधे सडक खण्डको विवरण

यो सडक आयोजना लुम्बिनी प्रदेशको रुपन्देहि र कपिलवस्तु जिल्लामा अवस्थित रहेको छ। आयोजना बुटवल नजिकैको तिनाउ पुलबाट शुरु भई बटौली बजार, मैना बजार, नयाँ गाउँ, बेलबास, नयाँ बस्ती, बंकटहवा, मुर्गीया, रामपुर वासगढी, सालभण्डी, पिपरा, बडगाउँ, जितपुर, गोरुसिंधे बजार हुदै गोरुसिंधेमा समाप्त हुनेछ। सडक आयोजना स्थललाई तल चित्रमा देखाईएको छ।



विद्यमान ५० कि.मी. लम्बाई रहेको बी.जी. सडक २ लेनको बिटुमिनस सडक हो र जसमा ६ मिटर चौडाइको carriage way र दुवैतिर १ मिटर चौडाइको shoulder रहेको छ। यो सडक पूर्व-पश्चिम राजमार्गको प्रमुख खण्डहरू मध्ये एक हो, जसले भारत संग धेरै सिमापार व्यापारिक सुविधाहरूलाई जोडेको छ। यो सडक खण्ड धेरै ठाउँमा खाल्डाखुलि, कालोपत्रमा चिरा परेका कारण र फुटपाथ भत्किएकोले हालको अवस्था नाजुक रहेको छ। यो सडक खण्डमा रहेका रिटेनिङ्ग वालहरू जिर्ण अवस्थामा रहेका छन् र पैदल मार्ग, पैदल यात्री कसिङ्ग, फुटपाथ, ट्रफिक सुरक्षा चिन्हहरू, दुर्घटना अवरोध (crash barrier) आदि जस्ता सडक सुरक्षा सम्बन्धी सुविधाहरू रहेका छैनन्।

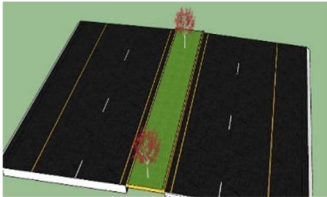
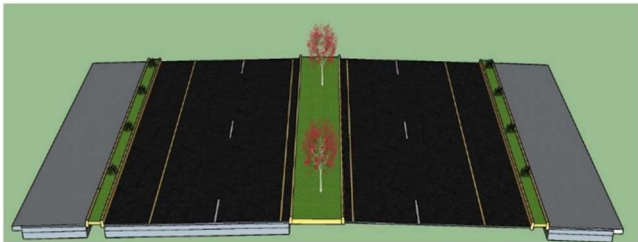
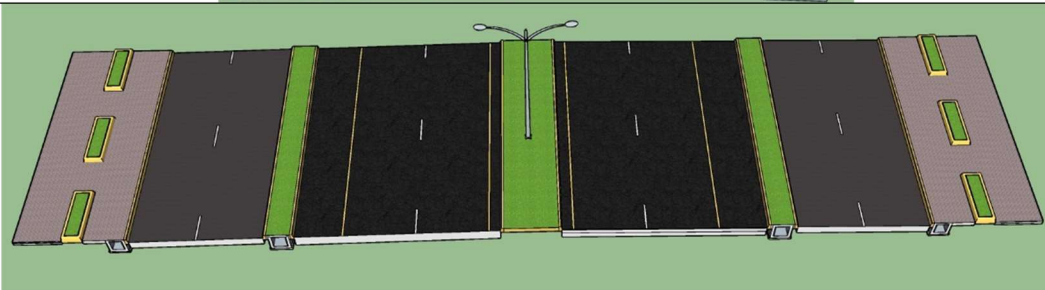
बी.जी. सडकमा थप सेवा सडकहरू (१६.५ कि.मी सहर र १०.८ कि.मी. अर्ध शहरी क्षेत्रमा) र फुटपाथ र साईकल लेनहरू (शहरी क्षेत्रमा १६.४ कि.मी) सहित २ लेनबाट ४ लेनमा स्तरोन्नती गरिने छ। पुराना पुलहरूलाई बिस्थापित गरि १० देखि १०० मिटर लम्बाईका ३१ वटा नयाँ पुलहरू पनि निर्माण गरिने छ। सडकको विद्यमान राइट अफ वे (ROW) ५० मिटर रहेको छ र यस सडकका प्रस्तावित कार्यहरू उलब्ध ROW भित्रनै सिमित रहने गरि कार्यान्वयन गरिने छ। यस आयोजनामा थप जग्गा अधिग्रहण गर्न नपर्ने तर ROW अतिक्रमण गरि बनाईएका संरचनाहरूलाई स्थानान्तरण गर्नुपर्ने हुन्छ। ट्रफिक चिन्ह स्थापना सहित गती सीमाको प्रावधान समावेश लगायत सडक सुरक्षामा सुधार गर्ने बी.जी. सडक सुधारका मुख्य विशेषता हुनेछन्। यस बी.जी. सडकका प्रस्तावित सडक स्तरोन्नती कार्यका विशेषताहरू तालिका E1 र स्तरोन्नतीको अवधारणत्मक डिजाईन चित्र E2 मा समावेश गरिएको छ।

तालिका E1. विद्यमान बी.जी. सडक र प्रस्तावित स्तरोन्नति कार्यक्रमका मुख्य विशेषताहरू

विशेषताहरू	विद्यमान सडको अवस्था	प्रस्तावित स्तरोन्नतिका कार्यक्रमहरू
लम्बाई	५० कि.मी.	५० कि.मी.
भूगोल	समथल (४८.३ कि.मी.), रोलिङ्ग (२.६ कि.मी.)	समथल (४७.४ कि.मी.), रोलिङ्ग (१.७ कि.मी.)
राइट अफ वे (ROW)	५० मिटर	५० मिटर
कूल चौडाई (सडक + सेवा लेन + सोल्डर)	७.५० मिटर देखि ८.५० मिटर	२४ मिटर ग्रामिण (ग्रामिण र वन) क्षेत्रहरू (जम्मा लम्बाई: २२.६८ कि.मी.) ३३ मिटर अर्ध शहरी क्षेत्रहरू (१०.७६ कि.मी.) ५० मिटर शहरी क्षेत्रहरू (१६.३६ कि.मी.)
लेनहरूको संख्या	२	४ (प्रत्येक लेनको चौडाई ३.५ मिटर)

विशेषताहरू	विद्यमान सडको अवस्था	प्रस्तावित स्तरोन्नतिका कार्यक्रमहरू
सेवा लेनहरूको लागि अतिरिक्त लेनहरूको संख्या	हाल नभएको	- गैर शहरी क्षेत्रमा नहुने - २ (प्रत्येकको चौडाई ३.५ मिटर) शहरी र अर्ध शहरी क्षेत्रहरूमा (सोल्डरको दुवै किनारामा)
फुटपाथ	हाल नभएको	- ग्रामिण र अर्ध शहरी क्षेत्रमा नहुने - २ (प्रत्येकको चौडाई २ मिटर) शहरी क्षेत्रमा (सर्भिस रोडको दुवैतिर)
साइकल लेनहरू	हाल नभएको	- ग्रामिण र अर्ध शहरी क्षेत्रहरूमा नहुने - २ (चौडाई २.३ मिटर) शहरी क्षेत्रहरूमा (फुटपाथहरूको दुवैतिर)
मिडियनको लम्बाई	हाल नभएको	सडकको पुरै ५० कि.मी लम्बाईमा ३ मिटर चौडाई को मिडियन
सोल्डरको विद्यमान चौडाई	०.५० मिटर देखि १.०० मिटर	२.५ मिटर चौडाईको कालोपत्रे सोल्डरहरू
पुलहरूको संख्या	३१	३१
कल्भर्टहरूको संख्या	१५३	१५३
रिटेनिङ्ग वालहरूको लम्बाई	११२ मिटर	सालाखाला १५०० मिटर
साइड ड्रेनहरूको लम्बाई	२५ कि.मी.	७०.४४ कि.मी.
सडक सुरक्षामा स्तरोन्नतिहरू	हाल नभएको	प्रमुख गाउँहरू/बजारहरू: १९ प्रमुख संगम स्थलहरू (junctions): ४ सामान्य संगम स्थलहरू (junctions): १२

चित्र E2: बी.जी. सडकको प्रस्तावित सुधारको अवधारणात्मक डिजाइन

In Rural Areas (total width 24 m)	
In Semi-urban Areas (total width 33 m)	
In Urban Areas (total width is 50m)	

बुटवल-गोरुसिंघे सडकको ESIA को दायरा (Scope)

ESIA अध्ययनको दायरा निम्न बमोजिम रहेको छ ।

१. आयोजनाको प्रस्तावित सीमाक्षेत्र (३०० मिटर कोरिडोर, सडकको मध्य भागबाट दुवैतर्फ १५० मिटर दुरी, प्रत्यक्ष प्रभाव पर्ने क्षेत्र) र आयोजनाले असर पुऱ्याउने क्षेत्र (२ कि.मी. कोरिडोरमा अप्रत्यक्ष असर पर्ने क्षेत्र) को अधिनमा रहि वातावरणीय तथा सामाजिक आधारभूत स्थितीको स्थापना गर्ने ।

२. आयोजनाको पूर्व निर्माण देखि, निर्माण, संचालन र मर्मत सम्भारको सम्पूर्ण चक्रको अवधिमा आयोजनाका कारणले हुने अतिरिक्त सम्भावित प्रतिकूल र सकारात्मक वातावरणीय र सामाजिक (E&S) जोखिम र प्रवाहहरु पहिचान गर्ने ।

३. बी.जी. सडक आयोजना संग सम्बन्धित सरोकारवालाहरुको संलग्नताको लागि सरोकार संलग्नता योजना (Stakeholder Engagement Plan), श्रम व्यवस्थापन प्रक्रिया (LMP), लैंगिक हिंसा (GBV) साथै सम्भावित सबै जोखिमहरु लगायत वातावरणीय स्वास्थ्य सुरक्षा (EHS) जोखिम र प्रवाहहरु सम्बोधन हुने गरि प्रवाह न्यूनीकरण कार्यहरुको तयारी गर्ने ।

कानूनी तथा साहायता रुपरेखा

नेपालको कानूनी रुपरेखा विश्व बैंकको वातावरणीय तथा सामाजिक रुपरेखा, वातावरणीय स्वास्थ्य तथा सुरक्षा सम्बन्धी निर्देशिका अनुरूप वातावरण तथा सामाजिक प्रभाव मुल्याङ्कन प्रतिवेदन (ESIA) तयार पारिएको छ । ESIA को यो खण्डले आयोजना कार्यान्वयनको क्रममा लागू हुने वातावरणीय र सामाजिक नीतिहरु लगायत विधान र संस्थागत रुपरेखाहरुको सिंहावलोकन गरेको छ । नेपाल राष्ट्रको कानूनी र संस्थागत रुपरेखा नेपालको संविधान (२०१२) मा आधारित रहेको छ, जसले सबैलाई स्वच्छ र स्वास्थ्य वातावरणमा बाँच्न र प्राकृतिक श्रोतको संरक्षण, प्रवर्द्धन र दीगो उपयोग गर्ने अधिकार प्रदान गरेको छ । यसमा नेपालको विद्यमान कानूनी संरचनाहरुको विस्तृत विश्लेषण गरि विकास आयोजना रणनीति, नीति, ऐन र नियमहरु जस्ता सबै सान्दर्भिक दस्तावेजहरुको समिक्षा समेत समावेश गरिएको छ । राष्ट्रिय निर्देशन तथा निर्देशिका साथै मापदण्डहरुले नियामक रुपरेखाको आवश्यकताहरु पुरा गर्न सहयोग पुऱ्याई आयोजना कार्यान्वयनको स्तरमा लागू गरिने/हुने उपयोगी ब्यवहारिक उपकरणहरु प्रदान गर्न मद्दत पुऱ्याउछ ।

विद्यमान रुपरेखाको विश्लेषण तालिका बनाई बुटवल-गोरुसिंघे सडकको वातावरणीय र सामाजिक मुल्याङ्कनको सन्दर्भमा निम्न लिखित प्रावधानहरु समेत जोड दिएको छ ।

यस संग सम्बन्धित केहि महत्वपूर्ण कानून तथा नियमावलीहरु (तर सिमित नभएको) यसप्रकार रहेका छन्: सडक सुरक्षा कार्यजोना (२०१३-२०२०), नेपाल राष्ट्रिय जैविक विविधता कार्ययोजना (२०१४-२०२०), वातावरण संरक्षण ऐन/नियमावली (२०१९/२०२०), बन ऐन र नीति (२०७२), श्रम नीति (२०६३), जग्गा प्राप्ती, पुनर्वास तथा पुनः स्थापना नीति (२०७२), लुप्त प्राय वन्य जीव तथा वनस्पतिको अन्तराष्ट्रिय ब्यापारमा नियन्त्रणका लागि ऐन (२०१७), बाल श्रम निषेधाज्ञा तथा नियमावली (२०५७), जग्गा प्राप्ति ऐन (२०५४ संशोधन सहित), जलश्रोत नियमावली (१९९३), औद्योगिक नीति/नेपालले विभिन्न अन्तराष्ट्रिय सम्मेलन र सन्धिहरुमा हस्ताक्षर गरेका बुंदा, सिमावर्तीय वा विश्वव्यापि प्रकृतिक प्रदुषण, मौसम परिवर्तन र जैविक विविधता संरक्षण जस्ता महत्वपूर्ण वातावरणीय र सामाजिक मुद्दाहरु सम्बोधन गर्न बाध्य छ । यस ESIA को प्रक्रियामा अन्तराष्ट्रिय सन्धि/सम्झौताको प्रावधानहरुलाई समेत ध्यानमा राखि समावेश गरिएको छ ।

आधरभूत वातावरण तथा सामाजिक स्थिति

आधरभूत तथ्याङ्क जस्तै भौतिक विज्ञान, जल विकास तथा प्रवाह, भूविज्ञान, भूउपयोग, वनस्पती, जिवजन्तु, वन वनस्पतीको स्थिती, जलवायु परिवेश तथा वायुको गुणस्तर, परिवेशको ध्वनी स्तर लगायत जोखिमको अवस्था इत्यादिको स्थिती मुल्याङ्कन अगस्त २०२० देखि जनवरी २०२१ सम्म गरेको थियो ।

यसले प्रस्तावित आयोजना संग सम्बन्धित निजी सम्पत्ति, सांस्कृतिक सम्पदा, सार्वजनिक उपयोगिताहरु, आदिवाशी जनजाति (IP), जोखिममा परेका समूहहरु, आयोजना प्रभावित समूहहरु, लैंगिक हिंसा (GBV), व्यवसाय जन्य स्वास्थ्य र सुरक्षा (OHS) जस्ता सामाजिक विशेषताहरुको पनि मुल्याङ्कन गरेको थियो ।

भौतिक वातावरण

बी.जी. सडक क्षेत्र मुख्यतया तराई क्षेत्र भित्र पर्दछ, जसको उचाई ११७ देखि १५८ मीटर (समुद्र सतह भन्दा माथि) रहेको छ । यस सडकको प्रारम्भिक बिन्दू करिब १.७ कि.मी.खण्ड चुरे पहाड श्रृंखलाको फेदमा पर्दछ । यस बी.जी.

सडक खण्डमा अवस्थित भूमी प्रयोगको अवस्था मुख्य रूपमा निर्मित क्षेत्र (६१%), वनहरु (२१%), खेतीवारी (१६%) र बाँकी जलक्षेत्र रहेको छ। यो सडकको भूमी प्रयोग नक्सा चित्र E2 मा देखाईएको छ। यो सडक खण्डको मौसम आर्द्र र उष्ण प्रकृतिको रहि उष्ण कटिबंधीय र उप-उष्ण कटिबंधीय जलवायुमा अवस्थित छ। सामान्यतया वर्षाको मौसम जून महिनामा सुरु भई सेप्टेम्बर महिनामा समाप्त हुने गरेको छ। वर्षातको मौसममा करिब ८०% वर्षा हुन्छ। कपिलवस्तुको औसत न्यूनतम तापक्रम १८.७९ डिग्री सेल्सियस र अधिकतम तापक्रम ३०.९३ डिग्री सेल्सियस रहन्छ। आयोजना क्षेत्रका अधिकांश ठूला नदीहरु महाभारत पहाड श्रृंखलाबाट निस्किएका छन्। कतिपय नदीहरुमा वर्षातको समयमा बाढी आउने सम्भावना हुन्छ भने बाँकी मौसममा सुख्खा रहन्छ।

प्रस्तावित सडक खण्ड गंगाको समतल भूभाग (माथिल्लो तराई) र पश्चिम नेपालको चुरे श्रृंखला समूहको चट्टानमा अवस्थित रहेको छ। यो सडक खण्डको प्रारम्भिक बिन्दु करिब १.७ कि.मी. खण्ड चुरे पहाड श्रृंखलाको फेदमा पर्दछ भने बाँकीले गंगाको समतल भूभाग ओगटेको छ। बी.जी. सडकको प्रारम्भिक १ कि.मी. खण्डमा पहिरो लगायत पुराना पहिरोहरुको अवशेष तथा बाढीबाट कटान भएका क्षेत्रहरु बिद्यमान रहेको छ।

नौ स्थानमा अनुगमन गरिएको वायुको गुणस्तर मापनले वन क्षेत्र बाहेकको क्षेत्रमा पि.एम. National Ambient Air Quality Standards (NAAQS) भन्दा बढी रहेको देखिएको छ। औसत २४ घण्टामा ध्वनीको स्तर ३१.१ dB(A) देखि १२९.१ dB(A) सम्म फरक पाईयो। सबैभन्दा बढी ध्वनीको स्तर बुटवलमा र न्यून वन क्षेत्रमा पाईएको थियो। बुटवलमा मापन गरेको ध्वनीको स्तरले राष्ट्रिय मापन सीमा (NNQSL) र विश्व बैंकको EHS को मापदण्ड नाघेको पाईयो। पिउने पानीको गुणस्तरको सम्बन्धमा सबै मापदण्डहरु नेपाल खानेपानीको गुणस्तर मानक (NDWQS) सीमा भित्रनै रहेको पाईयो।

जैविक वातावरण

आयोजनाको प्रायजसो भाग उष्णकटिबन्धीय (tropical zone) क्षेत्रमा पर्दछ र यस सडक खण्डमा साल रुखको अधिपत्य रहेको पाईएको छ भने नदी किनारको तटीय क्षेत्रमा सिसौ-खयरको मिश्रित वन क्षेत्रहरु रहेका छन्। रुपन्देहि जिल्लाका प्रमुख वन क्षेत्रका ब्लकहरु चेनेज² कि.मी. ६११+८७० देखि ६१७+७३० (सालभण्डी-पिपरा फरेष्ट ब्लक, जसको लम्बाई यस सडक अन्तर्गत ५८६० मी. र यसलाई चित्र E2 को बक्स A मा दर्साईएको छ) सम्म फैलिएको छ।

कपिलवस्तु जिल्लाका अन्य प्रमुख वन क्षेत्रहरु कि.मी. ६२६+९७० देखि कि.मी. ६३५+२०० (गोरुसिंघे फरेष्ट ब्लक, जसको लम्बाई ८१३० मी. रहेका छ, चित्र E-2 बक्स B) र कि.मी. ६३७+७२० देखि कि.मी. ६३९+००० (भदारे/बुढि फरेष्ट ब्लक, लम्बाई १२८० मी., चित्र E-2 बक्स B) सम्म फैलिएको छ।

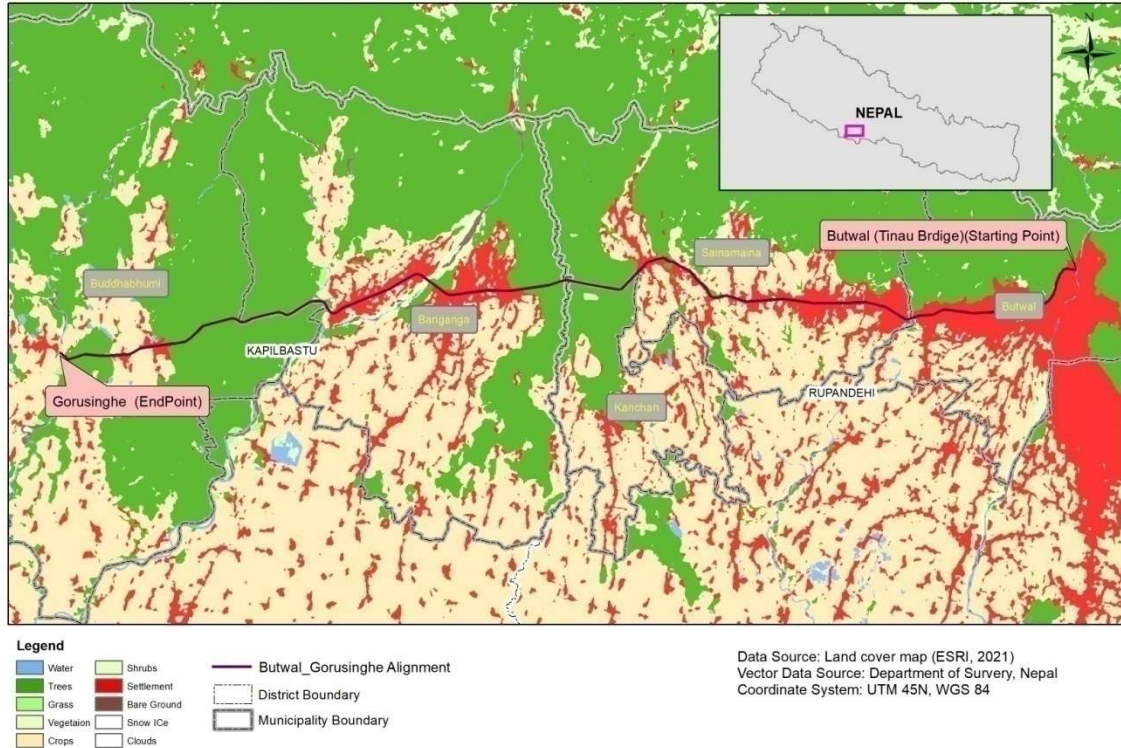
यि वनहरु मुख्यतया: (> ८०%) सामुदायिक वनहरु हुन् र काठ दाउरा चिरानका लागि समुदायले प्रयोग गर्दै आईरहेका छन्। यो सडकको दुवैतिरको ५० मिटर ROW (सडको केन्द्रबाट दुवै छेउ २५ मिटर) पहिलेनै बिखण्डित भईसकेको र सडक विभागको स्वामित्वमा रहेको पाईएको छ।

यो आयोजनाको प्रत्यक्ष र अप्रत्यक्ष प्रभाव क्षेत्रमा पहिचान गरिएका वन्यजन्तुको आवस क्षेत्र लगायत migration corridor हरु नरहेको र राष्ट्रिय वा अन्तराष्ट्रिय रूपमा तोकिएको संरक्षित क्षेत्र र अन्य महत्वपूर्ण वासस्थान (critical habitat) हरु समेत आयोजना क्षेत्रमा छैनन्।

चित्र E2: बी.जी. सडकको भूउपयोग नक्सा

² यो सडकको सुरुवाती चेनेज पूर्व पश्चि राजमार्गमा कि.मी. ६८९+७०० सुरु भई कि.मी. ६३९+७०० मा समाप्त भएको छ।

Butwal Gorusinghe Road Section with Landuse



यस आयोजनाको प्रारम्भिक चरणको महत्वपूर्ण वासस्थान मुल्याङ्कन (critical habitat screening) ले ३ गम्भिर रूपमा लोपोन्मुख चरा प्रजातीहरू, १ लोपोन्मुख चरा प्रजाती, १ गम्भिर खतरामा परेको उभयचर र ३ लोपोन्मुख उभयचर प्रजातीहरू उपस्थिति रहेको देखाएको छ। यद्यपि IFC-PS6 को प्रावधान लागू गर्दा यी CR र EN प्रजातीहरू दक्षिण पूर्व एशीया, दक्षिण एशीया (हिमालय क्षेत्र र नेपाल) मा व्यापक रूपमा छरिएर रहेकोले आयोजनाको बुटवल-गोरुसिंगे सडकको दायौँबायाँ दुवैतिर १ कि.मी. क्षेत्र विश्लेषणको पारिस्थितिक रूपमा उपयुक्त क्षेत्र (ecologically appropriate area of analysis) धेरै सानो रहेकोले यस आयोजनाको सुधारले यी प्रजातीहरूको विश्वव्यापि जनसंख्यालाई असर नगर्ने अपेक्षा गरिएको छ। तसर्थ यस आयोजनाको ROW र DIA मा महत्वपूर्ण वासस्थानको उपस्थिति नरहेको निष्कर्ष निकालिएको छ।

सामाजिक-आर्थिक र सांस्कृतिक वातावरण

आयोजना स्थल रुपन्देही र कपिलवस्तु जिल्लामा पर्दछ र आयोजनाले बुटवल महानगरपालिका लगायत सैनामैना, वाणगंगा, बुद्धभूमि नगरपालिका कञ्चन गाउँपालिका भागहरू चर्चेको छ। आयोजना क्षेत्रमा ब्राम्हण, क्षेत्री, दलित, मुस्लिम, मधेसी जनजातीहरूको बसोबास रहेको छ। आयोजना क्षेत्रमा नेवार, गुरुङ्ग, राई र चौधरी (थारु) गरि पाँच वटा जनजाती समुदाय रहेका छन्। उनीहरू स्थानिय समुदायमा एकिकृत छन् र आयोजना क्षेत्रको जग्गामा सामुहिक संलग्नता नभएको पाईएको छ। २२ वटा वडामा समेटिएको प्रभाव क्षेत्रको कूल जनसंख्या १,४४,९१४ रहेको छ। यो जनसंख्यामा पुरुष र महिला क्रमशः ६८,२३२ र ७६,६८२ छन्। यस सडको केहि खण्डहरूको ROW भित्र व्यवसायी स्थापनार्थ आदिवासी जनजातीका २७ वटा घर संरचना सहित ९९ घरपरिवारले ROW अतिक्रमण गरिएको पाईयो र सामुदायिक छलफल गर्ने क्रममा यिनीहरूको ROW सित कुनै सांस्कृतिक सम्बन्धता समेत नरहेको पाईयो। यो आयोजनामा कूल प्रभावित जनसंख्या ४९५ रहेको छ।

सरोकारवालाको संलग्नता र सार्वजनिक परामर्श/सुनुवाई

यो आयोजनाको जिवन चक्रमा सरोकारवालाहरूलाई संलग्न गराउने समावेशी प्रक्रिया हो। यो प्रक्रियाले विश्व बैंकको ESS10 को भावना अनुरूप विभिन्न सरोकारवालाहरूको राय सुन्ना/आवाजहरू पहिचान गरि समेटेको हुन्छ। ESIA

तयारि क्रममा सरोकारवालाहरु संग परामर्श गरिन्छ र यसले स्थानिय गाउँपालिका, नगरपालिकाहरु लगायत प्रत्यक्ष र अप्रत्यक्ष रुपमा प्रभावित समूहका समस्याहरु सम्बोधन गर्ने गर्दछ । आयोजनाबाट प्रभावित पक्षहरु भन्नाले आयोजनाको गतिविधीहरु बाट प्रत्यक्ष रुपमा प्रभावित र प्रभावको कोरिडोर भित्र रहेको समुदायलाई जनाउँदछ र उक्त समूहमा स्थानिय जनसंख्या, सर्वजनिक सेवा प्रदायकहरु र स्थानिय स्वास्थ्य सुविधामा अतिक्रमण भएका घरपरिवारहरु समावेश हुन्छन् ।

आयोजना प्रभावित समूहका अतिरिक्त पहिचान भएका अन्य सरोकारवालाहरु स्थानिय सरकारहरु (१ उपमहानगरपालिका, ३ नगरपालिका र १ गाउँपालिका) लगायत स्थानिय गैर सरकारी संस्थाहरु (NGO), नागरिक समाज, शिक्षक, राजनितिक नेता, महिला समूह, स्थानिय उद्यमीहरु, जोखिममा परेका र अपाङ्गता भएका व्यक्तिहरु, सिमान्तकृत वर्ग/समूह, स्थानिय प्रयोगकर्ता समूह (वन, पानी, सिंचाई आदि), सुरक्षाकर्मी (ट्राफिक, प्रहरी, सेना), चालक र सडक प्रयोगकर्ता (यात्रु समेत) रहेका छन् । आयोजना सम्बन्धी जानकारी माथि उल्लेखित सबै वर्गहरु, सरोकारवालाहरु सित साभा गरिएको थियो । प्रारम्भमा पैदल हिंडेर सर्वेक्षण गरियो भने त्यसपछि स्थानिय सरकारी अधिकारिहरुसंग व्यक्तिगत अन्तरवार्ताहरु लिईएको थियो । प्रत्यक्ष समूह सित छलफल (FGD) र प्रमुख सुचानादाता अन्तरवार्ता (KII) जस्ता उपकराणहरु छलफल सन्चालन गर्न प्रयोग गरिएको थियो । डिसेम्बर २०२१ देखि जनवरी २०२२ को समयमा कपिलवस्तु जिल्लाका विभिन्न नगरपालिका/गाउँपालिकाहरुमा २७ वटा परामर्श बैठकहरु आयोजना गरिएको थियो । यो परामर्शहरुमा ३३२ पुरुष र ११० महिला गरि जम्मा ४४२ सहभागिहरुले भाग लिएका थिए । वन विभाग, वन उपभोक्ता समूह, महिला, प्रभावित व्यक्ति, अन्य सरोकारवाला पक्षहरु जस्ता विशिष्ट र इच्छुक समूहहरु संग थप परामर्श गरिएको थियो ।

परामर्शका क्रममा सरोकारवालाहरुले उठाएका मुख्य बुँदाहरु यसप्रकार रहेका छन्: प्रभावित क्षेत्र/जग्गा लगायत प्रभावित निजी तथा सार्वजनिक संरचनाहरुको मुवाब्जा, वायु प्रदुषण, वस्ती क्षेत्रमा आकासे पूल, स्थानिय जनतालाई सीप विकास र रोजगारिको अवसर, पहिरो संरक्षण, अतिरिक्त साईड ड्रेन, पूल/पूलेसा र कर्भट निर्माण, कटान भएका रुखको स्वामित्व सम्बन्धित वन उपभोक्ता समूहलाई दिनुपर्ने, सडक छेउमा वृक्षारोपण, सडक किनारामा रहेका सामुदायिक वन क्षेत्रमा तारबार र सडक स्तरोन्नती कार्यक्रममा सरोकारवालाहरुको संलग्नता इत्यादि ।

वातावरणीय तथा सामाजिक जोखिम र प्रभावहरु

बी.जी. सडक सुधारबाट लाभकारि प्रवाहहरुमा आर्थिक विकासमा सहजिकरण, रोजगारी श्रृजना, व्यवसायहरुका लागि अवसर श्रृजना हुने, सेवा र बजारहरुमा पहुँच, सुधारिएको सडक पूर्वाधारले सुरक्षा समस्याहरुलाई न्यूनीकरण गरि सुरक्षित यातायातको सुनिश्चितता इत्यादि परेका छन् । लाभकारि प्रभावहरु सडक पूर्वाधारको सुधार र यसको प्राविधिक दक्षता, आर्थिक विकास र स्थानिय जनताको जिविकोपार्जन संग सम्बन्धित छन् । सबै प्रभावहरुलाई तिनीहरुको परिणाम र महत्वको आधारमा वर्गिकृत गरिएको छ ।

निम्न खण्डहरुले प्रत्येक सान्दर्भिक वातावरणीय र सामाजिक जोखिमहरु र प्रवाहहरुलाई संक्षेपमा प्रस्तुत गरेको छ ।

वातावरणीय र सामाजिक जोखिम र प्रभावहरुको मुल्याङ्कन र व्यवस्थापन (ESS1): यस सडकलाई २ लेन बाट ४ लेनमा विस्तार गर्ने कार्य सडक विभागले तोकेको ROW भित्र नै सिमित रहनेछ । विस्तारको क्रममा आवासिय तथा व्यापारिक संरचनाहरु हटाउने र करिब २८ एकड वन क्षेत्र फडानि गर्न आवश्यक रहेको पाईएको छ । प्रस्तावित कार्यले जम्मा ९९ निजी संरचनाहरुलाई असर गरि मुख्यतया यी संरचनाहरुको अगाडीको भाग (बरण्डा) लाई आंशीक रुपमा क्षती पुग्ने, ६५ वटा व्यवसायी संरचनाहरु लगायत यी घरपरिवारको जिविकोपार्जन लाई असर पर्ने देखिन्छ । यी प्रभावित घरपरिवारहरु मध्ये २३ घरधुरीहरु जनजातिका रहेका छन् र तिनीहरुले ROW मा अतिक्रमण गरेका कारणले FPIC गर्न बाध्यकारी अवस्था नरहेको समेत निक्यौल गरिएको छ । थप ४ घरधुरी लगायत एउटा व्यवसाय पूर्ण रुपमा प्रभावित भई स्थानान्तर गर्न आवश्यक रहेको छ ।

निर्माणको क्रममा प्रवाहहरु मुख्यतया धुलो र ध्वनी प्रदुषण, श्रमिक र समुदायको स्वास्थ्य र सुरक्षामा बढेको जोखिम, बढेको ट्राफिक प्रवाह र ट्राफिक सम्बन्धी दुर्घटनाहरु, लैंगिक हिंसा (GBV) र बालश्रम जस्ता श्रमको बढ्दो प्रवाहहरु संग सम्बन्धित सामाजिक समस्याहरु छन् । यि सबै प्रवाहहरु निर्माणको क्रममा हुने अपेक्षा समेत गरिएको छ ।

बी.जी. सडकको स्तरोन्नतिमा कुनै महत्वपूर्ण संचयी (cumulative) प्रवाहहरु पर्ने देखिदैन । किनभने आयोजनाका कार्यहरु सडक विभागले छुट्याएको ROW भित्र नै सिमित रहने छन् र सडक दाँयाबाँयाको क्षेत्र जनसंख्या बृद्धिले मानव

बस्ती विकास, अतिक्रमण, भूमी रुपान्तरण, कृषि विकास र अन्य सम्बन्ध विकास भैरहेको उक्त क्षेत्र खण्डित भई रुपान्तरण भईरहेको छ (चित्र E2 मा प्रस्तुत भूउपयोग नक्सामा देखिए जस्तै) । यो सडकको सुधार कार्यहरु गरे वा नगरे तापनि विकेन्द्रिकरण उन्मुख विकासका कारण सहरी विकास, ग्रामिण क्षेत्रको विकास जस्ता क्रियाकलापहरुको परिणाम स्वरूप भू-उपयोग परिवर्तन र भूमी परिवर्तन भईसकेको छ र आगामि दिनमा पनि जारी रहने छ । यसको अतिरिक्त हालका वर्षहरुमा वरिपरिका ग्रामिण सडकहरु प्राय कुनैपनि वातावरणीय तथा सामाजिक अध्ययन/मुल्याङ्कन र जोखिम न्यूनीकरणका उपायहरु नअपनाई निर्माण गरिएका छन् । सडक सञ्जालको बढ्दो घनत्व र सुरक्षात्मक उपायहरुको अभावले वातावरणमा प्रतिकूल असरहरु पहिले देखिनै बढेको देखिएको छ । स्थलगत अध्ययनका क्रममा देखिएका असरहरु जस्तै नदीको बहाव र अवसादनमा बढोत्तरी, ढल निकास साथै वर्षातको भेलको कमजोर व्यवस्थापन र सामुदायिक स्वास्थ्य र सुरक्षामा खतरा ईत्यादि । यो प्रवाहहरु जवायु परिवर्तन र स्थानिय जनसमुदायको असंबद्ध (uncoordinated) विकास शैलीले बढ्दै जाने सम्भावना देखिएको छ जसले कालान्तरमा आर्थिक क्षती समेत निम्त्याउन सक्नेछ ।

श्रम र कामको अवस्था (ESS2): बी.जी. सडक आयोजनामा प्रत्यक्ष, अनुबद्धित र प्राथमिक आपूर्ती कामदारहरुलाई रोजगारि उपलब्ध हुने सम्भावना देखिएको छ । उक्त वर्ग श्रम शिविरको कमजोर वासस्थान/सुविधा, श्रमशोषण, सुविधावट बन्चित, रोजगारिमा भेदभाव, बालश्रम वा जबरजस्ती श्रम, व्यवसायिक स्वास्थ्य र सुरक्षा सम्बन्धी जोखिम पर्नसक्ने पनि त्यतिकै सम्भावना रहेको पाईयो । फलस्वरूप कार्यस्थल दुर्घटनामा कामदारहरु संग सम्बन्धित गुनासा तथा लैंगिक विभेद (GBV) सम्बन्धी गुनासाहरुमा बढोत्तरी आउने समेत मुल्याङ्कन गरिएको छ । अनुबद्धित कामदारहरु यस्ता जोखिमहरु बाट बढि प्रभावित हुने पाईएको छ । आयोजनाले करिब ५०० देखि ६०० जना कामदारहरुलाई रोजगारि दिनेछ र करिब ८०% कामदारहरु स्थानिय समुदायबाट लिईने छ । श्रमिकका लागि गुनासाहरु सुन्ने, दर्ता गर्ने र सम्बोधन गर्ने संयन्त्रको स्थापना समेत गरिने छ ।

श्रोत दक्षता र प्रदुषण रोकथाम व्यवस्थापन (ESS3): ESS3 ले मुख्यतया सौदर्य, वायु तथा ध्वनी प्रदुषण, सम्भावित खतराहरु, फोहर मैला व्यवस्थापन, पानीको श्रोतहरुको प्रदुषणका साथै सम्बन्धित जोखिम र प्रवाहहरुलाई समेटेको हुन्छ ।

फोहर मैलाको अनुचित व्यवस्थापन, पूल पूलेसा, कल्भर्ट, निर्माणको क्रममा नदीहरुको मौसमी धार अवरुद्ध, पानीको श्रोतमा थप चाप, वायु तथा ध्वनी प्रदुषण, निर्माण कार्य/निर्माण सामग्रीबाट निस्कने धुँवा, धुलो, खानी सन्चालन र खानीबाट निर्माण सामग्रीको ढुवानी, ठूल/ठूला मेशीनको प्रयोग र तिनबाट निस्कने धुँवा, कम्पन (vibration) ईत्यादिले हुने प्रदुषण लगायत बाट सम्बेदनशील समुदायमा आत्याधिक प्रभाव र असर पर्ने देखिन्छ । यी सबै प्रभावहरुका असर निर्माण चरणमा बढि देखिए तापनि प्रवाह न्यूनीकरण अध्ययनमा वर्णन गरिए अनुसार ध्वनी, वायु र खानेपानी लगायत राष्ट्रिय मापदण्डहरुको अनुपालन गर्नुका साथै सडक निर्माण परियोजनाहरुमा लागु हुने उत्कृष्ट अभ्यासहरु/विशेष उपायहरुको अनुशरण गरेमा असर न्यूनीकरण गर्न सकिने देखिन्छ ।

सामुदायिक स्वास्थ्य सुरक्षा (ESS4): निर्माण सामग्रीको ढुवानीले स्थानिय समुदायलाई अप्ठ्यारो पर्न सक्ने देखिएको छ । आयोजनाका गतिविधिहरु जस्तै पहाड कटान (करिब १ कि.मी. लम्बाई), सडक उत्खनन, हेभी उपकरणहरुको कम्पनले पहिरोको जोखिम र वायु प्रदुषणमा बढोत्तरी हुने देखिन्छ । निर्माणको क्रममा उत्पादन हुने निर्माण सामग्रीको मलुवा भण्डारले परिदृष्य र खेतीयोग्य जमीनलाई बाधा पुर्‍याउनुका साथै जल निकायहरु दुषित हुनसक्ने देखिन्छ । निर्माण गतिविधि, निर्माण सवारी साधनको चाप, राजमार्ग छेउछाउमा निर्माण सामग्रीको भण्डारले यातायात आवागमनमा असर पर्ने देखिन्छ । आयोजना श्रेत्रमा बाहिरी श्रम शक्तिको उपस्थितिले वातावरण र स्थानिय समुदायहरुमा नकारात्मक प्रभाव पर्नसक्ने हुँदा लैंगिक हिंसा (GBV) तथा द्वन्द सिर्जना हुन नदिन समयमै चनाखो भई न्यूनीकरणका उचित उपायहरु अपनाउनु पर्ने देखिन्छ । आयोजना क्षेत्रमा प्रष्ट परिभाषित र सम्बन्धित प्रतिक्रिया संयन्त्रको अभाव भएको श्रम सित सम्बन्धित (GBV) को जोखिमको स्तरलाई पर्याप्त (Substantial) आंकलन गरिएको छ । यस बाहेक GBV सेवा प्रदायकहरुको संस्थागत र पूर्वाधारात्मक क्षमताको कमीले लैंगिक हिंसाबाट उन्मुक्ति पाएका ब्यक्ति/समुदायलाई यथोचित सल्लाह अपर्याप्त मात्रामा उपलब्ध हुने देखिन्छ । यस अतिरिक्त बाह्य श्रमको आगमन र बाहिरियाहरुको बढ्दो चलखेल/आवत जावतले CoVID-19, HIV/AIDS, STIs लगायत संक्रामक रोगहरुको फैलावटलाई बढ्न मद्दत पुर्‍याउने देखिन्छ ।

भूमी अधिग्रहण, भूमी प्रयोगमा प्रतिबन्ध र अनैच्छिक पुर्नवास (ESS5): कूल ९९ घरधुरीका १०३ वटा संरचानाहरु, ROW अतिक्रमण गरि बनाईएकाले प्रभावित हुनेछन् । आयोजनाकै लागि नयाँ जग्गा प्राप्तीको आवश्यकता नहुने समेत

अध्ययनको सिलसिलामा जानकारी भएको छ। कूल ९९ प्रभावित घरधूरी मध्ये ४३ घर परिवारले मात्र आवास, ४८ घरधूरीले आवास तथा साना ब्यवसायिक संरचनाहरु र १७ घरधूरीले ब्यापारिक संरचना गुमाउने छन्।

९९ घरधूरी मध्ये ४ वटा संरचना पूर्ण रुपमा प्रभावित छन्। कूल प्रभावित घरपरिवारमा २३ जनजाती (ROW भित्र अतिक्रमणका कारण), ८ मुस्लिम, र ३ दलित रहेका छन्। आयोजनाले १६२ सार्वजनिक संरचना (१९ मन्दिर, ६८ वटा विश्राम स्थल, ६१ वटा विसौनी, २ वटा सार्वजनिक शौचालय) लाई असर पुऱ्याउने छ।

यस बाहेक १,६४६ बिजुलीका पोलहरु र खानेपानी आपूर्ती (DWS) पाईपहरु लाई स्थानान्तर गर्न आवश्यक देखिएको छ। बुटवल-गोरूसिँगे सडक आयोजनाको यथोचित आवास, कार्य योजना रुपरेखा (RAP) मा उल्लेखित प्रक्रिया अनुसार आयोजना कार्यान्वयनको त्रममा निर्माण सम्बन्धी प्रवाहहरुको समेत व्यवस्था गरिने छ।

जैविक विविधता संरक्षण र जीवित प्रकृतिक श्रोतहरुको दिगो ब्यवस्थापन (ESS6): यस क्षेत्रको विकास र मानव बसोबासको लामो इतिहासको कारण यस क्षेत्रमा मानव सिर्जित क्रियाकलापहरुको प्रभाव अत्याधिक मात्रामा रहेको छ, र जसको कारण ROW र वरपरको क्षेत्रहरुमा रहेको वन्यजन्तुहरुको वासस्थान पहिले देखिनै खण्डित अवस्थामा रहेको पाईएको छ। वातावरणीय र सामाजिक मानक (ESS6) र IFC कार्यसम्पादन मानक (PS-6) अन्तर्गत वन्यजन्तुहरुको महत्वपूर्ण वासस्थानको लागि गरिएको आधारभूत प्रारम्भिक आधार र ESIA अध्ययनले देखाए अनुरूप यी CR र EN प्रजातीहरु दक्षिण पूर्व एशीया, दक्षिण एशीया (हिमालय क्षेत्र र नेपाल) मा ब्यापक रुपमा छरिएर रहेकोले आयोजनाको बुटवल-गोरूसिँगे सडकको दायँबायाँ दुवैतिर १ कि.मी. क्षेत्र विश्लेषणको पारिस्थितिक रुपमा उपयुक्त क्षेत्र (ecologically appropriate area of analysis) धेरै सानो रहेकोले यस आयोजनाको सुधारले यी प्रजातीको विश्वब्यापि जनसंख्यालाई असर नगर्ने अपेक्षा गरिएको छ। तसर्थ यस आयोजनाको ROW र DIA मा महत्वपूर्ण वासस्थानको उपस्थिति नरहेको निश्कर्ष निकालिएको छ।

यो सडक आयोजनाले करिब करिब १५.२ कि.मी. सडक लम्बाईमा २८ हेक्टर वन क्षेत्रलाई असर गर्ने छ। यो आयोजना सुधार बाट प्रत्यक्ष असर पर्ने गरि करिब करिब ९,३८६ रुखहरु काटिने छन्। जसमध्ये २,२२५ ससाना विरुवाहरु, १,६९१ पोल साइजका विरुवाहरु र ५,५११ बयस्क रुखहरु काटिने छन्। ROW भित्रको निर्माण कार्यले गम्भिर रुपमा जोखिममा परेका र लोपोन्मुख वासस्थानहरुमा प्रतिकूल असर नपर्ने देखिएको छ। यसका अतिरिक्त बी.जी. सडक खण्डमा कुनै संरक्षित क्षेत्र, वन्यजन्तु आरक्षहरु वा प्रवासी वन्यजन्तु/चराचुरुङ्गीहरुको आवगमन मार्ग समेत नरहेको निष्क्यौल गरेको छ। काटिने प्रत्येक रुखको लागि आयोजनाले नेपाल सरकारले तोकेको मापदण्ड अनुसार डिभिजन वन कार्यालयले तोकेको क्षेत्रमा १ रुख कटान बापत १० रुखहरु पुनरोपण गर्नेछ।

आदिवासी जनजाति (ESS7): आयोजना क्षेत्रमा नेवार, गुरुङ्ग, मगर, राई र चौधरी (थारु) गरि जम्मा ५ आदिवासी जनजाति (IP) समुदाय रहेका छन्। कूल २३ जनजातीहरुले ROW अतिक्रमण गरेका कारण संरचना गुमाउने छन्। यो समूहले निजी जग्गा भने गुमाउने छैनन् र आंशीक रुपमा मात्रै प्रभावित हुनेछन्। आयोजनाले तिनीहरुको जग्गा जमिनमा कुनै प्रत्यक्ष असर (प्रवाह) पर्ने देखिदैन र कुनैपनि IP समुदाय पूर्ण रुपमा रुपान्तरण हुने छैन र ति समुदायहरुको सांस्कृतिक सम्पदामा समेत कुनै प्रभाव नपर्ने देखिएको छ। ESIA ले मुल्याङ्कन गरे अनुसार जनजाती समुदायमा निर्माणका क्रममा पर्ने सम्भावित प्रवाह र जोखिमहरु मुख्यतया वाह्य श्रमको आगमन, लैंगिक हिंसा, ट्राफिक सुरक्षा तथा निर्माणको क्रममा वायु/ध्वनी प्रदुषण ईत्यादि पाईएका छन्। त्यसैले ESS7 को प्रावधान अनुरूप free, prior and informed consent (FPIC) को आवश्यकता नदेखिएको स्थलगत अध्ययनले औलाएको छ। जनजाती सम्बन्धी मुद्दाहरु RAP मार्फत थप सम्बोधन गरिने छ।

सांस्कृतिक सम्पदा (ESS8): यसले मूर्त र अमूर्त सांस्कृतिक सम्पदाको जोखिम र प्रवाहहरुलाई रेखाङ्कन गर्ने गर्दछ। ESIA अध्ययनको समयमा पुरातात्विक र ऐतिहासिक रुपमा मूर्त सम्पदाहरु गस्तै गुम्बा वा पुरातन स्मारकहरु बी.जी. सडकमा नरहेकोले यो सम्पदाहरुमा सडक विस्तार कार्यक्रमको कुनै प्रभाव नपर्ने देखिएको छ।

ROW मा बसोबास गरिराखेका परिवारबाट ३ वटा मठ/मन्दिरहरुको निर्माण भएको देखिएको छ। सरोकारवालाहरु संगको छलफल बाट यी मठ/मन्दिरहरुको कुनै ऐतिहासिक/सांस्कृतिक महत्व नरहेको समेत जानकारी गराईएको थियो। निर्माणको चरणमा यो संरचनाहरुलाई परिवारहरु सित परामर्श गरि आपसी समझदारीमा नजिकैको सार्वजनिक जग्गामा स्थानान्तरण गरिने छ। वातावरणीय र सामाजिक ब्यवस्थापन योजना (ESMP) मा Chance-finds procedure समावेश

गरिएको छ । यदि निर्माणको क्रममा "chance-find" फेला परेमा उक्त प्रक्रियालाई अनुपालन गरिने छ । Chance-find का प्रावधानहरू बोलपत्र, ठेक्का सम्झौता लगायत ठेकेदारको C-ESMP मा समेत समावेश गरिने छ ।

बितीय मध्यस्तकर्ताहरू (ESS9): यस परियोजनामा बितीय मध्यस्तकर्ताहरूको संलग्नता नहुने भएकोले ESS9 लागु हुने छैन ।

सरोकार वालाको संलग्नता र सूचना प्रकटीकरण (ESS10): सरोकारवालाको परामर्शमा समुदायहरूबाट प्राप्त प्रस्तावहरू निम्न बमोजिम रहेका छन् । प्रभावित भूमी लगायत प्रभावित निजी र सार्वजनिक संरचना र उपयोगिताहरूको लागि पर्याप्त मुवाब्जा, वायु प्रदूषण, वस्ती क्षेत्रमा आकाशे पूल निर्माण, स्थानियहरूलाई शीप विकास र रोजगारीको अवसर, पहिरो क्षेत्र संरक्षण, थप साईड ड्रेन र पूल/पूलेसा तथा कल्भर्टको निर्माण, काटिएका रुखको स्वामित्व सम्बन्धित वन प्रयोगकर्ता समूहलाई दिनुपर्ने, सडक क्षेत्रका सामुदायिक वन क्षेत्रमा वृक्षारोपण र तारबार ईत्यादि । आयोजना स्तरको GRM सहितको छुट्टै सरोकारवाला संलग्नता योजना (SEP) समेत तयार गरिने छ ।

वातावरणीय तथा सामाजिक व्यवस्थापन उपायहरू

ESS को प्रावधानहरू अनुरूप मुख्य व्यवस्थापनका उपायहरू यसप्रकार रहेका छन् । इच्छुक सरोकारवालाहरू बिचको सूचनाको आदान प्रदानले सबै न्यूनीकरणका उपायहरू सहज रूपमा कार्यान्वयन गर्न मद्दत मिल्ने देखिन्छ । आयोजनाले स्थानिय निकाय र सरोकारवालाहरूसँग स्थानिय विकासको योजना बनाउन समन्वय गर्नेछ ।

आयोजनाले वातावरण तथा सामाजिक प्रवाहहरू व्यवस्थापन गर्न न्यूनीकरण पदानुक्रम (mitigation hierarchy) समावेश गरि वातावरण तथा सामाजिक व्यवस्थापन योजना तयार गरेको छ । यसमा न्यूनीकरण उपायहरू, योजना अनुगमन प्रावधानहरू, क्षमता अभिवृद्धि जिम्मेवारी र रिपोर्टिङ प्रणाली लगायत वातावरणीय र सामाजिक लागतहरू समावेश गरिएको छ । यसको अतिरिक्त ESMP ले लैगिक हिंसा (GBV) सम्बन्धी समस्यालाई सम्बोधन गर्ने उपायहरू प्रदान गरेको छ । श्रमीक सम्बन्धी मुख्य मुद्दाहरूलाई राष्ट्रिय श्रम ऐन २०१७, श्रम नियमहरू २०१८ र विश्व बैंकको ESF 2018 को प्रावधान अनुरूप श्रम व्यवस्थापन योजना (LMP) र व्यवसायिक स्वास्थ्य र सुरक्षा योजना (OHS) तयार गरिने छ । कामदार सम्बन्धी गुनासाहरूको समाधान र व्यवस्थापनमा मद्दत गर्न आयोजनामा कार्यरत कामदारहरूको GRM को व्यवस्था गरिएको छ । कामदारहरूको शीविर संचालन तथा व्यवस्थापन योजना र कामदारहरूको आचार संहिता तयार पारिने छ । जसले लैगिक हिंसालाई निरुत्साहित वा न्यूनीकरण गर्न समेत मद्दत गर्नेछ । आयोजना गतिविधि बाट हुनजाने भौतिक र आर्थिक बिस्थापनलाई सम्बोधन गर्न छुट्टै RAP तयार गरिने छ । आयोजनाबाट सबै प्रकारका हानी/नोक्सानी (निजी र सार्वजनिक सम्पत्तिहरू) entitle matrix अनुसार प्रतिस्थापन लागत समेत समावेश गरि क्षतिपूर्ती दिईने छ । आयोजना कार्यान्वयनको क्रममा हुने कुनैपनि अतिरिक्त प्रवाहहरू सम्बोधन गर्न RAP तयार गरिएको छ र सो मा भएका प्रावधान अनुरूप क्षतिपूर्ती रकम निर्धारण गरिने छ । ESMP अनुसार ठेकेदार आयोजना स्थलमा परिचालन भए पश्चात र निर्माण कार्य सुरु गर्नु पूर्व ठेकेदारले अनिवार्य रूपमा C-ESMP तयार गर्नुपर्ने हुन्छ ।

C-ESMP ले नेपाल सरकार तथा विश्व बैंक तथा IFC को कामदारको लागि आवास निर्देशिका (workers' accommodation guidelines) अनुरूप OHS योजना, खानेपानी तथा फोहर व्यवस्थापन योजना, श्रमीक शीविर व्यवस्थापन योजना, ट्राफिक व्यवस्थापन र सडक सुरक्षा व्यवस्थापन योजनाहरू, खानी तथा निर्माण सामग्री उत्खनन क्षेत्र व्यवस्थापन योजना र आयोजना स्थल पुनर्स्थापना योजना समावेश गर्नेछ । आयोजनाको सरोकारवालाहरू पहिचान गरि र आयोजनाको जिवनचक्र भरि सरोकारवालाहरूसँग संलग्न हुने योजना उपलब्ध गराउनको लागि आयोजनाले सरोकारवाला संलग्नता योजना (SEP) तयार गर्नेछ ।

SEP ले महिला र युवतीहरूलाई जोड दिदै स्वास्थ्य र सुरक्षित रहने प्रवृत्तीको प्रवर्द्धन गर्दै सामुदायिक चेतना र सम्बेदनशीलताको लागि सामग्री उपलब्ध गराउने छ । SEP मा कुनैपनि प्रश्न र गुनासाहरू उठाउनको लागि सरोकारवालाहरूको लागि आयोजना स्तरमा GRM को विवरणहरू समेत समावेश गरिएको हुनेछ ।

सामान्य जोखिम र प्रवाहहरूको लागि न्यूनीकरण उपायहरू: सामान्य जोखिम र प्रवाहहरूको न्यूनीकरणका लागि निम्न उपायहरू अवलम्बन गर्न प्रस्ताव गरिएको छ जो यस प्रकार रहेका छन् । बायोइन्जिनियरिङ पछि सुदृढीकरण संरचनाहरू सहितको संरक्षण योजना, प्रभावित परिदृष्य (landscape) को पुनर्स्थापना, खानी उत्खनन तथा भण्डारण योजनाको विकास, इन्धन कुशल यन्त्र तथा वाहनको छनौट र वृक्षारोपण द्वारा कार्बन व्यवस्थापन/न्यूनीकरण सम्बन्धी सिफारिस,

अर्थपूर्ण परामर्शका साथ समुदायलाई विश्वासमा लिई सबै प्रभावित संरचना/उपयोगिताको उचित स्थानान्तरण र पुनर्स्थापन, शिकार निरुत्साहित र नियन्त्रण सम्बन्धी योजना, उपयुक्त स्थानहरूमा गति सीमा संकेतहरू स्थापना र चालकलाई सचेतना प्रदान गर्ने, गुनासोको लागि गुनासो सुनुवाई संयन्त्रको स्थापना, श्रमीकहरूको लागि काममा आवत जावत गर्न सहजताको लागि यातायातको व्यवस्थापन, PPEs हरूको उपलब्धता, श्रम कानूनको अनुपालन, कामदार शीविर संचालन निर्देशिकाको स्थापना, खतरनाक सामग्रीको प्रयोग, भण्डारण, ढुवानी तथा विषर्जन गर्नको लागि योजना, पानी गुणस्तर योजना, महिला तथा किशोर/किशोरी केन्द्रित सामुदायिक चेतना र संवेदनशीलता सम्बन्धी योजना, खतरनाक रसायन र फोहर मैला व्यवस्थापन र विसर्जन सहितको योजना इत्यादि निर्माण शुरु हुनु अगावै विकास गरिसक्नुपर्ने प्रावधान रहि आएको छ र यस आयोजना विस्तारले कुनैपनि मूर्त वा अमूर्त पुरातात्विक रूपमा महत्वपूर्ण सम्पदाहरू प्रभावित हुने छैनन् ।

साईट विशिष्ट न्यूनीकरण उपायहरू, निर्माण स्थलमा ट्राफिक व्यवस्थापनका प्रावधानहरू समावेश गरि बायोईन्जिनियरिङ्ग लगायत अन्य भौतिक संरचनाहरूको निर्माण गर्ने, धुलो र धुवा नियन्त्रण गर्ने, हावा र ध्वनी प्रदूषणको मापन अनुगमन, निर्माण क्षेत्रबाट विषर्जन गरिने पानीको गुणस्तर अनुगमन साथै धुलो नियन्त्रण गर्न नियमित पानी छर्ने व्यवस्था मिलाउने, आयोजना क्षेत्रमा पानीको बहाव सुनिश्चित गर्न cross drainage संरचनाहरू जस्तै (बक्स कल्भर्ट, पूल/पूलेसाको निर्माण, साईड ड्रेन) निर्माण गरिने छ । सडक सुरक्षाको लागि ट्राफिक संकेत, सडक सुरक्षा संकेत, crash barrier, पैदल यात्रुहरूको लागि आकाशे पूल इत्यादिको स्थापना । बाढी तथा नदी कटान नियन्त्रणको लागि river training works को स्थापना, वन्यजन्तु आवत जावत गर्ने स्थानमा गति सिमा सहित संकेत चिन्हहरूको स्थापना, वृक्षारोपण इत्यादि गरिने छ । सार्वजनिक उपयोगिताहरूको स्थानान्तरण (खानेपानी, आपूर्ती लाईनहरू, बिजुलिका पोलहरू, सिंचाई, कूलो/नहर इत्यादि), क्षतीग्रस्त पूर्वाधारहरूको पुनर्स्थापना, सुरक्षा उपायहरू (PPEs) र CoVID-19 माहामारीबाट बच्न अतिरिक्त गतिविधिहरूको लागि चाहिने रकमको व्यवस्थापन न्यूनीकरण लागत योजनामा समावेश गरिएको छ । श्रम विमाको लागत, खानी तथा निर्माण सामग्री उत्खनन, कामदार शिविर, batching plants को पुनर्स्थापना लान्ने लागत पनि न्यूनीकरण लागत योजनामा समावेश गरिएको छ ।

वातावरणीय तथा सामाजिक प्रतिवद्धता (ESCP) को लागि मुख्य उपाय र कार्यहरू

ESCP ले ESS मा भएका प्रावधानहरू पुरा गर्न उपाय र कार्यहरू पहिचान गरेको हुन्छ । यो ESCP मा आयोजनाको लागि आवश्यक ठहरिएका ESP, LMP, र RAP को विकास समावेश गरिएको छ ।

सडक विभागको विकास साहायता कार्यान्वयन महाशाखा (DCID) द्वारा सञ्चालन र कार्यान्वयन गरिएका वातावरण तथा सामाजिक प्रवर्द्धन योजनाका कार्यक्रमहरूको अनुपालन भए नभएको अनुगमनको जिम्मेवारी भौतिक पूर्वाधार तथा यातायात मन्त्रालय (MoPIT) मा निहित रहने छ ।

ESCP मा तोकिए बमोजिम सडक विभाग द्वारा अनुगमन गरि विश्व बैंकलाई रिपोर्ट बुझाउनु पर्नेछ । विश्व बैंकले आयोजनाको कार्यान्वयन अवधि भर भएका भौतिक उपाय र कार्यहरूको प्रगति र सम्पन्नताको अनुगमन र मुल्याङ्कन गरिनै रहने छ ।

यदि आयोजना परिवर्तन र अप्रत्यासित परिस्थितीहरूको अनुकूल व्यवस्थापन प्रतिबिम्बित गर्न अथवा आयोजना कार्यान्वयन सम्पादन मुल्याङ्कनको प्रतिक्रियाका क्रममा यदि आवश्यक भएमा ESCP परिमार्जन र आवधिक गर्न सकिने छ ।

संस्थागत व्यवस्था

भौतिक पूर्वाधार तथा यातायात मन्त्रालय अन्तर्गत रहेको सडक विभाग बी.जी. सडक स्तरन्तोती कार्यान्वयनको लागि प्रमुख निकाय हो । सडक विभागमा आयोजनाहरू विकास र कार्यान्वयन गर्न पाँच उपनिर्देशक/महाशाखाहरू रहेका छन् । क्षेत्रीय कार्यान्वयनलाई सहज बनाउन सडक विभागले ३३ वटा डिभिजन सडक कार्यालयहरूको स्थापना गरेको छ । विकास सहयोग कार्यान्वयन महाशाखा (DCID), सबै दाताहरू द्वारा प्राप्त अनुदान तथा आयोजना संचालन गर्ने प्रमुख निकाय मध्ये एक हो ।

DCID अन्तर्गत आयोजना व्यवस्थापन इकाई (PMU) ले प्रारम्भिक वातावरण परिक्षण (IEE), ESIAs, RAPs/IPDPs तयार पार्ने काम गर्छ र अन्य E&S जोखिम व्यवस्थापन गर्ने कार्य गर्दछ । यस आयोजनाको व्यवस्थापनका लागि PCU बनाइने

छ। सडक विभागको Geo Environment and Social Unit (GESU) सडक विभागमा E&S जोखिम व्यवस्थापन र अनुगमनको लागि प्रमुख क्षेत्रीय निकाय हो। GESU ले सरकारी/दातृनिकायहरू द्वारा अनुदान प्राप्त आयोजनाहरूको IEEs, ESIAs, RAPs र IPDPs को अनुपालन, अनुगमन र समिक्षा गर्ने गर्दछ। भौतिक पूर्वाधार तथा यातायात मन्त्रालयलाई वातावरण संरक्षण ऐन (EPA) ले यातायात क्षेत्रको आयोजनाहरूको IEEs समिक्षा र अनुगमन गर्ने प्रमुख जिम्मेवार सरकारी निकाय तोकेको छ। यसले वन तथा वातावरण मन्त्रालय (MoFE) ले समिक्षा र स्वीकृति प्रदान गरिएका ESIA प्रतिवेदनहरूको समिक्षा गरि अनुमोदन गर्दछ। MoFE अन्तर्गत EIA इकाइले ESIAs प्रतिवेदनहरू समिक्षा गरि स्वीकृति प्रदान गर्ने कार्य गर्दछ। वन तथा भूसंरक्षण विभाग (DoFSC)/डिभिजन वन कार्यालय, श्रम तथा व्यवसायिक सुरक्षा विभाग (LoLOS) र आयोजना प्रभावित नगरपालिका/गाउँपालिका जस्ता अन्य संस्थाहरूले आयोजना कार्यान्वयनको क्रममा सहयोगी भूमिका खेलेको हुन्छ। ठेकेदार/उपठेकेदारहरूले आयोजना निर्माणका दौरान ESMP र सम्बन्धित योजनाहरूको पालना गर्नु अनिवार्य हुन्छ। ESMP का प्रावधानहरू बोलपत्र, कार्य सम्झौता तथा DoR-ESCP मा समेत उल्लेख गरि समावेश गरिएको छ। संस्थागत सुदृढीकरण घटक अन्तर्गत आयोजनाले वातावरणीय तथा सामाजिक जोखिम र प्रभावहरू व्यवस्थापन गर्न आयोजना कार्यान्वयनमा संलग्न विभाग र निकायहरूको क्षमता अभिवृद्धिमा सहयोग पुर्याउने उद्देश्यले तालिमहरूको आयोजना गर्नेछ।

1 Introduction

The Government of Nepal is working towards accelerating economic development, reducing regional imbalances and addressing inequalities in the country. Recognizing that access to efficient transport and trade system is a key determinant of economic opportunity and service delivery. The government has requested World Bank funding to support the improvement and expansion of East-West Highway, starting with the Butwal-Gorusinghe section. The World Bank's support for the project will be part of Bangladesh, Bhutan, India Nepal Regional Transport and Trade Facilitation Program (BBIN/Nepal Phase I). Under this program, the GoN, through the Department of Roads (DoR) intends to upgrade the Butwal –Gorusinghe (BG) road section (50km) of East-West Highway from 2 lanes to 4 lane road. DOR is the Project's implementing agency and has prepared a comprehensive Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) for the Project. The ESIA is presented in this report, and the RAP is presented under a separate cover.

The GoN has requested funding for this Project from World Bank through the proposed 'Bangladesh-Bhutan-India-Nepal (BBIN) Multi-phase Programmatic Approach (MPA) Regional Transport and Trade Facilitation Program - Nepal Phase 1' (hereinafter referred to as **BBIN 1**). The BBIN 1 will support the GoN for (a) Upgrading of Butwal-Gorusinghe-Chanauta section of East-West Highway from 2 to 4 lanes, (b) Construction of a signature bridge (including detailed design/urban design and construction), (c) Support for development and implementation of green resilient highway concept, integrating transportation functionality and ecological sustainability, and (d) Upgradation of trade facilities at critical locations. DOR has also prepared an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for the overall BBIN 1 and presented under separate covers.

1.1 Background

Efficient movement of goods and people within and across the borders of Nepal is key to economic growth, and this goal is currently being hampered by challenges in cost-efficiency and resilience of trade and transport. The Butwal – Kohalpur – Gaddachauki section of the East-West (E-W) Highway is proposed to address these challenges. This project would be the first phase of a larger investment program along the western part of the E-W highway corridor that would allow the Government to achieve its development goals in terms of regional trade and sustainable economic growth.

East-West Highway is the main domestic as well as international trade corridor of Nepal. East-West highway (EWH) was constructed about 50 years ago with single-lane bituminous carriageway width and has been rehabilitated/up-graded to the double lane during different periods in between 1998-2005. East-West Highway is the main domestic as well as international trade corridor of Nepal. The East-West highway is part of the Asian Highway 2 (AH2). The Asian Highway Network (AHN), also known as the Great Asian Highway, is a cooperative project among countries in Asia, Europe and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and focused on improving the highway systems in Asia.

The present condition of the Butwal –Gorusinghe (BG) Road section does not respond to the needs of increased traffic flow and requires improvement. The existing highway is a two-lane carriageway road sealed with Bituminous Surface Treatment (DBST) in almost all areas.

The proposed project will support capacity, quality, and safety improvements of the East-West Highway. Butwal –Gorusinghe road section is of great importance to providing connectivity to the people of Lumbini Province and the rest of the country.

1.2 BBIN MPA Regional Transport and Trade Facilitation Program - Nepal Phase 1

The proposed BBIN 1 aims to develop cost-efficient and resilient trade and transport in Nepal along the main selected corridors. The BBIN 1 will have the following components:

- **Component 1:** Systems to facilitate trade. This component will support the adoption and Implementation of Digital and Automated Systems to Facilitate Trade (a) Development of Automated System for Customs Data (ASYCUDA) new modules and (b) Development of an Automated Border Management System (ABMS).
- **Component 2:** Enhancing Regional Transport and Trade Enabling Infrastructure. This component will support (a) Upgrading of Butwal-Gorusinghe-Chanauta section of East-West Highway from 2 to 4 lanes, (b) Construction of a signature bridge (including detailed design/urban design and construction), (c) Support for development and implementation of green resilient highway concept, integrating transportation functionality and ecological sustainability, and (d) Upgradation of trade facilities at critical locations.
- **Component 3:** Capacity building. The component will support in streamlining the policy environment for regional trade and cross-border movement of goods through (a) Implementation of the World Trade Organization (WTO) Trade Facilitation Agreement, (b) Transport specific reforms / Reforms to support local communities, and (c) Training programs and capacity building activities d. Project preparation studies.

1.3 The Proposed Subproject

Location and Current Road Conditions. Butwal - Gorusinghe Road Section of the East-West Highway starts from the Tinau Bridge at Butwal and ends at Gorusinghe (Budhi). This road section is 50 km in length. For most of the section, the width of the existing road is 8.00 m, including a 6 m wide carriageway and 1m shoulder on both sides. The project area lies between 27°42'14.80"N Latitude and 83° 27'36.87"E Longitude at Butwal to 27°39'18.85"N Latitude and 83° 0'2.79"E longitude at Gorusinghe. Butwal is at the intersection of Nepal's two different National Highways, East-West Highway and Siddhartha Highway. It connects western Nepal with the capital Kathmandu through the highway and air links (via the airport at Siddhartha Nagar). The proposed Butwal – Gorusinghe Road is located in the Rupandehi and Kapilbastu district of Lumbini Province. The location map of Butwal Gorusinghe road in the context of Asian highway is shown in **Figure 1.1**.

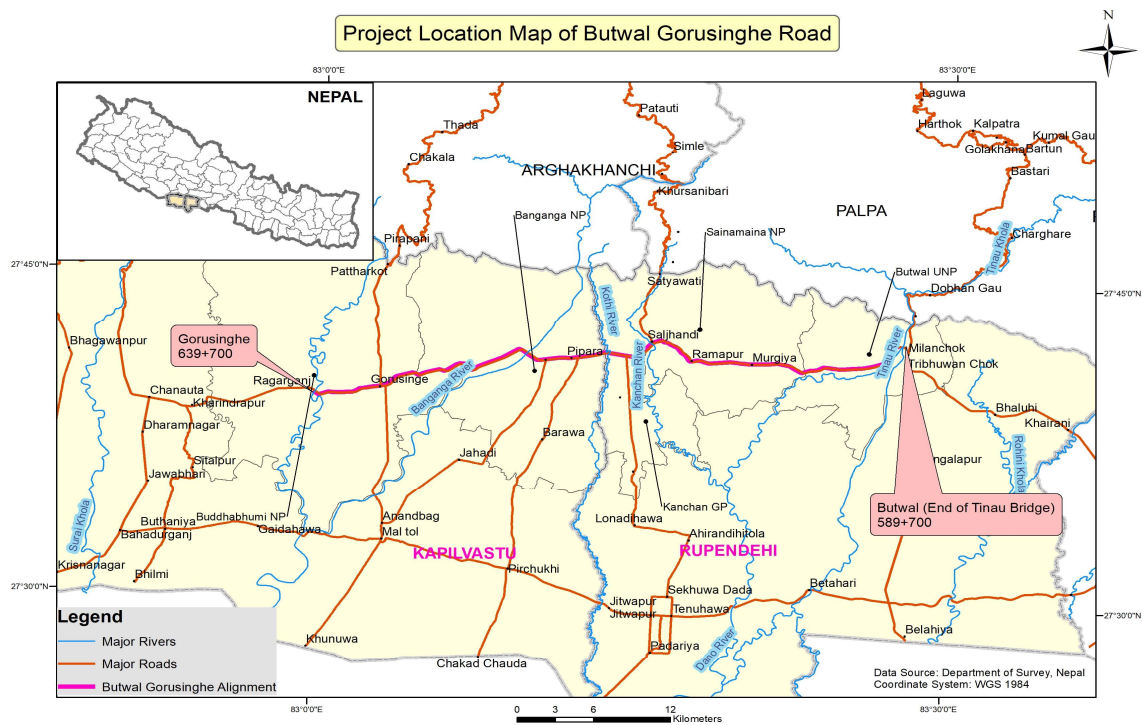


Figure 1.1: Location of the Project

Proposed Construction Works. A detailed description of the proposed facilities to be built is given in Chapter 3. A summary of the main physical works is given below:

- Widening of 50 km Butwal-Gorusinghe Road from 2 lanes to 4 lanes
- Construction of service roads on both sides of the carriage way in semi-urban areas
- Construction of footpaths, pedestrian sheds, cycle lanes and service roads on both sides of the carriage way in urban areas
- Construction of 31 new bridges with lengths varying from 10 to 100 m

1.4 The Environmental and Social Assessment of the Project

Studies and basic data: This ESIA is based on field studies and data collected during August 2021-January 2022 by the consultant team charged with the design of the project. A team of ecologists and environmental and social specialists of the design consultant have participated in the studies and collected data on the existing physical, biological and socio-economic environment of the project area. The team included Mr. Rajan Shrestha and Mr. Abisheke (environmental), Mr. Rabin Dhakal (social), and Mr. Prayag Raj Tamarkar (ecology) and Mr. Bharat Regmi (forestry). An independent consultant, Dr. Venkata Nukala, was retained by DoR to guide the design consultants for necessary data collection and prepare an independent ESIA report as per the guidelines of the World Bank with support from DCID environmental and social specialists, Mr. Yubaraj Satyal (environment) and Ms. Rama Shrestha (social). The team has conducted 33 consultation meetings (involving 489 individuals) with the affected communities, local governments, relevant environmental and forest departments, community-based organizations and NGOs. Field sampling and analysis were carried out at 16 locations for river water quality and at 9 locations for air and noise quality. The methodology followed for biological studies is given in Annex 1.

1.5 Content of the Report

Chapter 2 reviews the prevailing government regulatory requirements relevant to the environmental assessment and World Bank ESF applicable to this subproject, and actions taken by DRO to comply with these requirements. **Chapter 3** presents a detailed description of the proposed project facilities and other salient information relevant to the environmental and social assessment. Description of the baseline environmental, biological and social conditions in the project area are presented in **Chapter 4**. Potential environmental and social issues from the Project implementation, as well as the appropriate mitigation measures to address these negative impacts, have been discussed in **Chapter 5**. An Environmental and Social Management Plan (ESMP) is presented in **Chapter 6**. The proposed institutional arrangements for the management and monitoring of E&S impacts and risk are given in **Chapter 7**, together with the proposed grievance mechanism. Finally, **Chapter 8** describes the consultations that have been carried out with the stakeholders.

2 Project Description

This chapter presents a detailed description of the proposed activities in the Upgradation of Butwal-Gorusinghe Road Project.

2.1 Salient Features of Existing Project Road and Proposed Upgrades

The 50-km long Butwal – Gorusinghe Road is located in the Rupandehi and Kapilbastu district of Lumbini Province (see Figure 1.1 for the location map). It is a Section of East-West Highway that starts from the end of the Tinau Bridge at Butwal and ends at Gorusinghe (Budhi). The starting chainage of the road is KM 589+700 (this chainage is referenced to the East-West Highway) and ends at KM 639+700.

This road section is 50 km in length. The road alignment passes through one sub-metropolitan city and 4 municipalities. They are.

- Rupandehi district (from starting point to 25.6 km): Butwal Sub-metropolitan City, Sainamaina Municipality, Sainamaina Municipality, Kanchan Rural Municipality
- Kapilbastu district (from 25.6 km to the end point): Banganga Municipality, Buddhabhumi Municipality

The salient features of the existing road and proposed road upgrading works are given in Table 2.1.

Table 2.1: Salient Features of Existing Road and Proposed Upgrades

Features	Existing Road	Proposed Upgrades
Length	50 Km	50 km
Terrain	Plain (48.3 km), Rolling (1.7 km)	Plain (48.3 km), Rolling (1.7 km)
Right of Way	50 m	50 m
Total width (Road + shoulders)	7.50 m to 8.50m	• 24 m in non-urban (rural and forest) areas (total length : 22.68 km) • 33 m in semi-urban areas (10.76 km) • 50 m in urban areas (16.36 km)
Number of lanes	2	4 (each lane width 3.5 m)
Number of Additional Lanes for service roads	None	• None in non-urban areas • 2 (each width is 3.5m) urban and semi urban areas (on both sides of shoulders)
Foot paths	None	• None in rural and semi urban areas. • 2 (each width 2 m) in urban areas (on both sides of service roads)
Cycle lanes	None	• None in rural and semi urban areas (shoulder width can be used as a cycle lane in non-urban areas and service road in semi urban areas is proposed for local traffic, including motorcycle and cycle) • 2 (width 2.3 m) in urban areas (on both sides of foot paths) –
Length of median	None	3 m width of the median along 50 km
Existing shoulders widths	0.50 m to 1.00m (un paved)	2.5 m Paved shoulders
Number of bridges	31	31
Number of culverts	153	153
Length of retaining	112m	1500 m, approximately

walls		
Length of breast walls	208m	500 m, approximately
Length of gabion walls	56 m	2000 m, approximately
Length of side drains	25 Km	370.44 km
Road safety improvements		Number of major villages/bazaars: 19 Number of major junctions: 4 Number of minor junctions: 12

2.2 Description of the Existing Project Road

For most of the section, the width of the existing road is 8.00 m including 6 m wide carriageway and 1m shoulder on both sides. The Initial section, the alignment passes through the foot of the hillock, further the road passes through plain area. There are major junctions at Jitpur, Char-number Chowk, Bangai and Gorusinghe and there are twelve minor junctions which need to be upgraded. From 611+800 to 617+900 (Pipara) and from Kaila Khola Bridge (627+200) to Gorusinghe junction (634+900) the alignment passes through dense forest area. Major roadside tree cutting is required in this section while upgrading the road. There are relatively minimum obstacles such as buildings, houses within the ROW. However, there are number of bus waiting sheds, resting place (Chautari), electrical poles and cables and telecommunication facilities within the ROW have to be relocated during expansion of the road.

The pavement condition is good to fair. Traffic sign, delineator post, road painting, crash barrier are in poor condition. At many places, damage of pavement was found due to the poor surface drainage management. Most of the sections don't have longitudinal drainage facilities. There is drainage system in the city area only.

Drainage management, water logging, road safety, traffic congestion are major issues due to increasing with population growth on both sides of the highway, however, there are no road crossing structures established at the populated settlement areas all along the alignment

In the road alignment, there are 31 existing minor and major bridges. Among them Badganga Bridge is the longest bridge with length of 304 m. Out of 31, 23- numbers are of RC T-beam construction, one number at Kaila Khola (47/H001/310) is of pre-stressed T-Beam construction, 6-Bridges are of solid slab and one box-type construction.

2.2.1 Current Traffic and Future Traffic Estimates

The current traffic levels are measured at four locations (Butwal West, Saljhandi West, Jitpur West, and Gorusinghe East) for 72 hours continuously. The average vehicular traffic, excluding motor cycles (MC) and rickshaws, vary from 4,582 (in Gorusinghe) to 15,634 (in Butwal). The detailed traffic counts are given in Table 2.2.

Table 2.2: Existing Traffic on Butwal – Gorusinghe Road

Station Name	Surveyed Date From	Surveyed Date To	ADT (v/d)	ADT exc. Motor Cycle and Rickshaw (v/d)	AADT (v/d)	AADT exc. MC and Rickshaws (v/d)	AADT in PCU	AADT in PCU exc. MC and Rickshaws
Butwal West	07-Apr-21	09-Apr-21	40,981	15,643	36,883	14,079	34,655	23,064
Kanchan River	07-Apr-21	09-Apr-21	13,989	6,181	12,590	5,563	14,152	10,614
Jitpur West	07-Apr-21	09-Apr-21	19,134	8,032	17,411	7,309	16,577	11,525
Gorusinghe East	07-Apr-21	09-Apr-21	7,748	4,738	6,972	4,264	10,361	9,007

The future traffic volume growth rate was calculated by applying the future real GDP growth rate to traffic demand elasticity. The projected future traffic near Butwal is given in Table 2.3.

Table 2.3: Projected Traffic Near Butwal

Year	Truck			Bus			Car		2-3wheel		utility vehicle	others		Total (v/d)	
	multi-axle	heavy	light	Big	mini	micro	Car	four wheel	M/C	three wheeler	utility vehicle	tractor	power tiler	in.MC	ex.MC
2018	189	940	68	152	1,092	200	1,483	620	10,959	372	771	16	5	16,867	5,908
2029	315	1,574	114	287	2,062	379	4,000	1,670	21,801	703	1,292	26	5	34,228	12,427
2033	370	1,848	134	351	2,520	463	5,528	2,308	27,161	859	1,517	30	5	43,094	15,933
2038	444	2,223	161	441	3,171	582	8,016	3,348	34,896	1,082	1,824	35	5	56,228	21,332
2043	521	2,608	188	538	3,862	707	11,043	4,613	43,319	1,318	2,140	40	5	70,902	27,583
2048	599	2,998	217	640	4,591	841	14,598	6,098	52,350	1,568	2,459	45	5	87,009	34,659

2.3 Proposed Interventions

The proposed project involves key upgrading activities including geometry improvement, pavement upgrading, drainage improvement, retaining structures; slope protection/stabilization, other off-road works, and works on traffic management and road safety.

Geometry Improvement

This involves widening of road to varying width (24m in rural and forest area, 32m in semi urban, 50m in urban) to meet the design standards including sections along forest area, agriculture area, religious and cultural sites, markets, and built-up areas. Along selected major built-up areas and market fronts consideration has been made in preliminary design to widen the road to full width. The geometry improvement will enhance serviceability of road, provide hard stand to parking/stopping vehicles and better drainage management.

Table 2.4: Location of Urban, Semi Urban and Rural Areas as per Road width

S.N.	Location	From	To	Length(m)
1	Urban (50m width)	589+700	598+200	8500
2	Semi urban (33m width)	598+200	601+640	3440
3	Urban (50m width)	601+640	604+500	2860
4	Semi urban (33m width)	604+500	611+820	7320
5	None urban (24m)	611+820	617+800	5980
6	Urban (50m width)	617+800	621+500	3700
7	None urban (24m)	621+500	635+200	13700
8	Urban (50m width)	635+200	636+500	1300
9	None urban (24m)	636+500	639+700	3000
	Total Length			50,000

Source: Preliminary Design of Butwal –Gorusinghe Road, 2021

Road Width for Highway

Adequate roadway width has been provided besides the shoulders and a central median for dividing the traffic flow directions. Based on a comparative review of international standards and safety, the values proposed to be adopted for the roadway elements by the Consultant for the project highway are as follows

Table 2.5: Road Cross Section

S. No.	Element of Road	Urban	Semi -Urban	Rural
1	Carriageways, m	2 * 7.50	2 * 7.50	2 * 7.50
2	Service Lane, m	6.50*2		
2	Additional Lane, m		2 * 3.50	
2	Central Median, m	3.00	3.00	3.00
3	Side Median, m	3.00*2		
4	Divider, m		1.00*2	
5	Foot Path, m	4.00*2		
6	Paved Shoulder, m	2.5*2	2.5*2	2.5*2
7	Verge, m		0.50*2	0.50*2
8	Total Formation Width, m	50.00	32.00	24.00

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Depending upon the development of the urban and market area along the road side major three types of cross-sections are proposed to upgrade the existing road.

- Cross-section for urban areas
- Cross-section for semi-urban areas
- Cross-section for rural areas

Cross-section for urban areas: For enhancement of urban environment and drain off the storm water, three numbers of longitudinal green belt and four numbers of longitudinal drain has been proposed in this type of cross-section. In spite of the main dual carriage way of the width of 7.50 m each with central median of 3.00 m and both side shoulder 2.50m, in both side of the main dual carriage way a 6.50 m service lane has also proposed with median between main dual carriage way and service lane. Then after a 4.00 m width is proposed for foot path and cycle lane. Total width of urban area cross-section is 50.00m. (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m(with Rumble Strip as required) with Central Median - 3.00m, 6.00 m service lane with 3.00 m Side Median and 4.00 m Foot Path.

Cross-section for semi-urban areas: For accommodation of the semi-urban area traffic like tractors, three wheelers, motorcycles, etc., an additional lane in both side of main dual carriage way of the width of 7.50 m each with central median of 3.00 m and both side shoulder 2.50m, has proposed. Side drain for this cross-section has proposed as per requirement. A 1.00 m width lane separator between main dual carriage way and additional lane also proposed. The total width of the semi urban area cross-section is 33.00m (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m (with Rumble Strip as required) with Central Median of 3.00m and 3.50 m additional lane with 1.00 m lane separator and 0.50 m verge).

Cross-section for rural areas: The total width of the semi urban area cross-section is 24.00m (Carriageway 4-lane- 2x7.5m Paved Shoulder- 2x2.50m (with Rumble Strip as required) with Central

Median - 3.00m). Main dual carriage way of the width of 7.50 m each with central median of 3.00 m and both side shoulder 2.50m.

Proposed cross-section of the road is given in Figures 2.1, 2.2 and 2.3 for rural, semi-urban and urban sections, respectively.

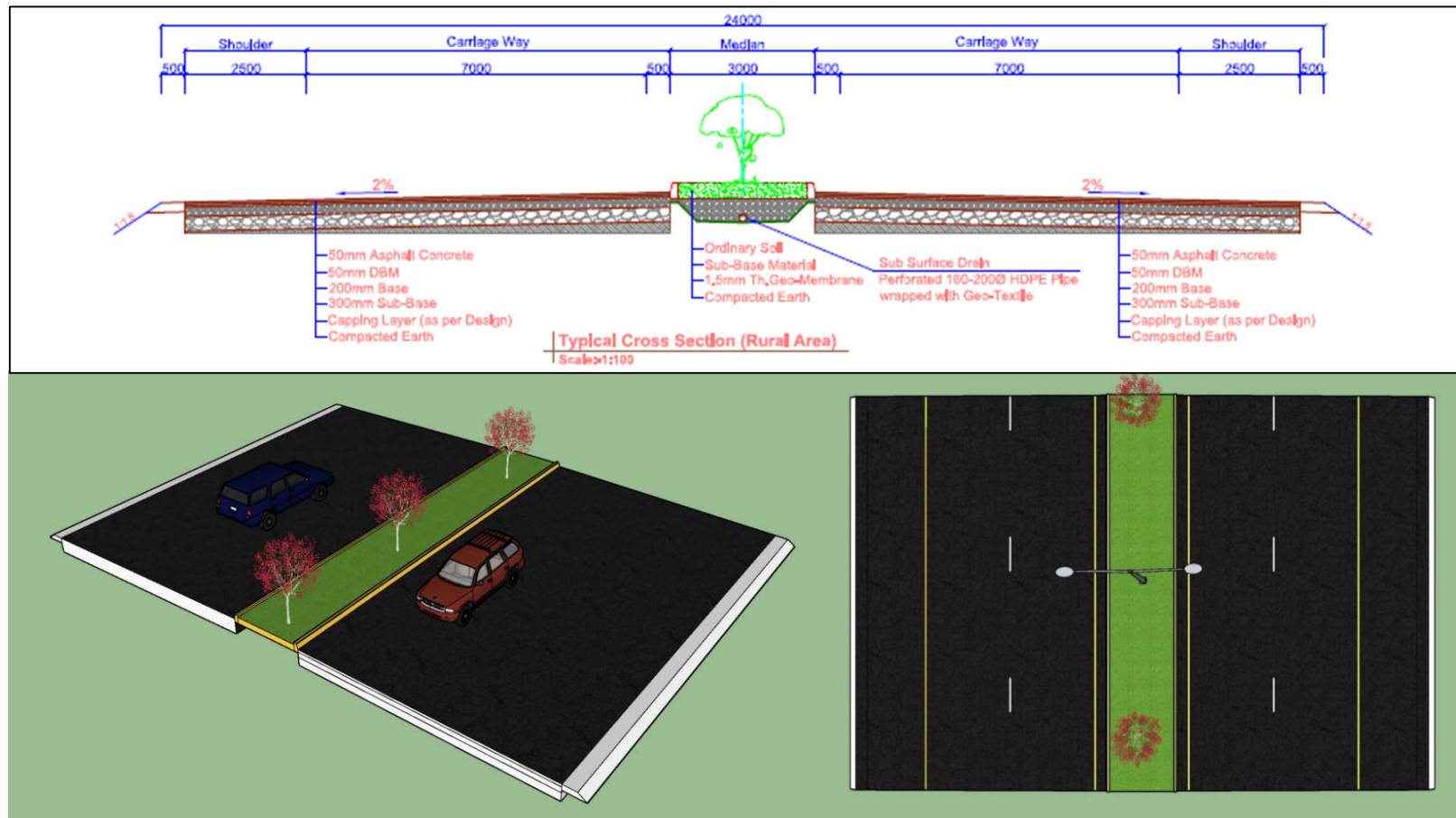


Figure 2.1: Typical Design of Rural Area (4 Lane Road)

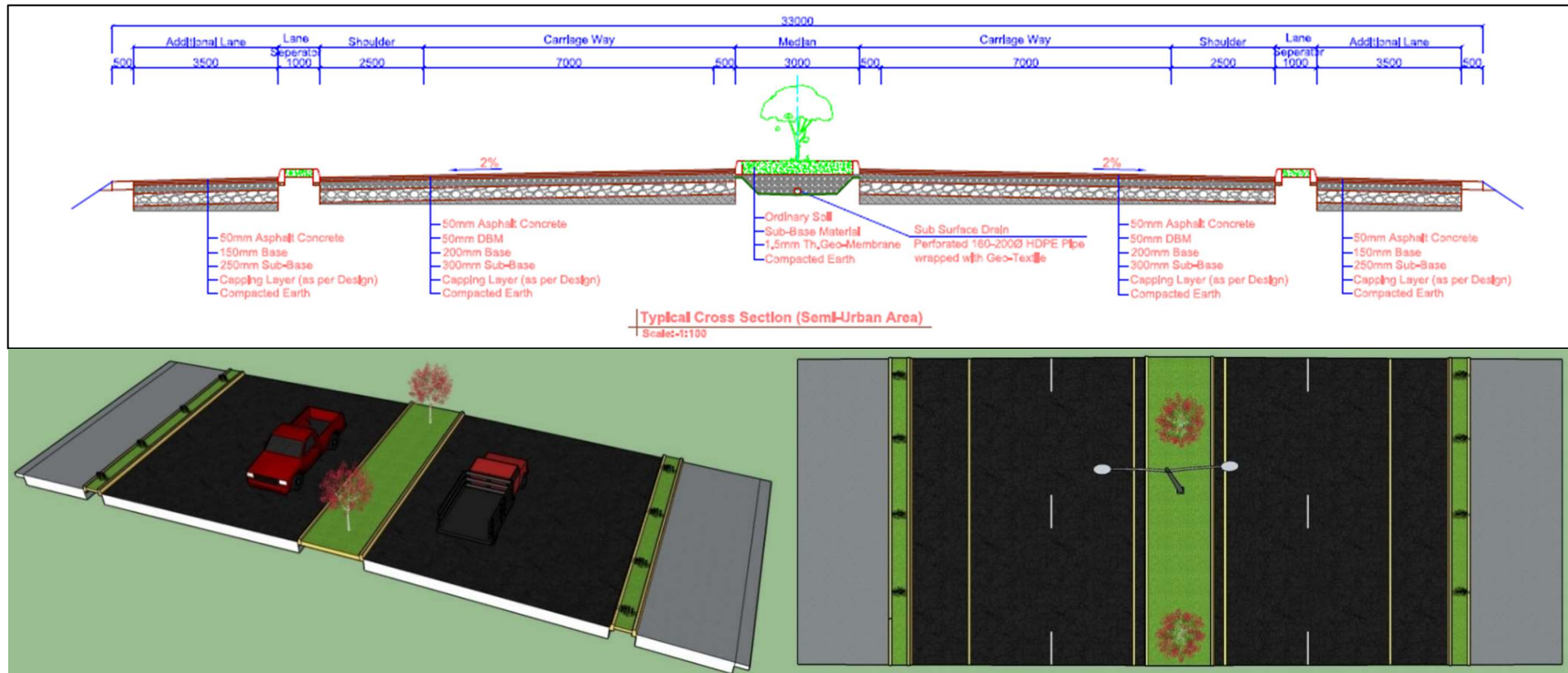


Figure 2.2: Typical Design of Semi-Urban Area (Intermediate Lane)

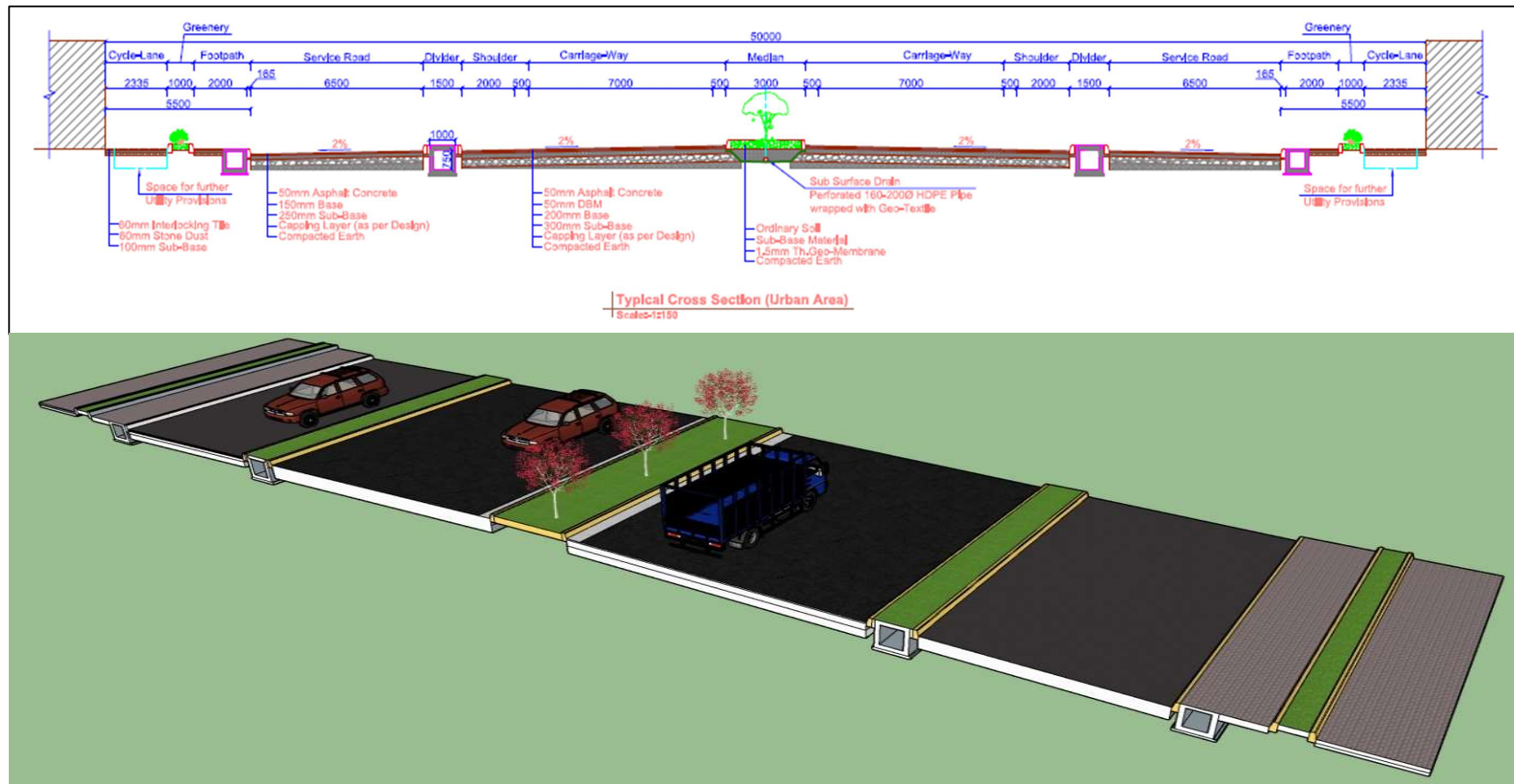


Figure 2.3: Typical Design of Urban Area (6 Lane Road)

Embankment Slope in filling

The slope of embankment is linked with its height. In accordance with the Standards for Safety in Road Design, the following are adopted for Embankment in Fill:

Height of embankment 4.5 m and above : 2 H : 1V with crash barriers

Height of embankment 3 m to 4.5 m : 2.5 H : 1 V

Height of embankment 1.5 m to 3 m : 3 H : 1 V

Height of embankment less than 1.5 m : 4 H : 1 V

The Consultant proposed to provide slopes of 1.5H: 1V in Fill sections.

Embankment slopes in Cutting:

Cut slopes are proposed as 1H: 2V or steeper with Intermediate berms in general however, these sections will be specifically analyzed for stability before adopting this slope or steeper slopes.

Pavement

Pavement will be design to with stand the traffic volume and axle load for 20 years period. Adequate drainage will be provided below the pavement layers and sub-grade level. Pavement layers in general will consist of granular sub-base, crushed stone base and asphalt concrete. Capping layer of suitable material will also be provided in those areas, where deemed necessary. Pavement will be designed as per Pavement Design Guidelines (Flexible Pavement)-2014 (Second Edition 2021), published by Department of Roads, Overseas Road Note 31 published by Transport Research Laboratory of UK or as per IRC 37: 2001 guidelines published by Indian Road Congress.

The bituminous surface pavement (Asphalt) will be designed to meet the expected traffic level and sub-grade strength. The design of the Intersections for access to approach for other connecting roads will to be provided to ensure the safety of vehicles diverging from or merging into high speed road. Intersection will be considered for major feeder roads, minor feeder roads, district roads. Road furniture will be provided in the form of road signs, crash barriers, road markings, delineators, foot paths, covered side drains.

Bridges

Different types of superstructures for bridges has required for design such as RCC T Beam, PSC Girder, IPC Girder, PSC Box Girder, etc. DOR Nepal Bridge Standards — 2067 will be the main guideline for the design of bridges. All bridges have been designed for a discharge of 100 yrs. return period. For the calculation of design discharge empirical formulas especially developed for other catchments shall not be used. All bridges shall be designed as per IRC loadings.

Basically for major and minor bridges RCC and PSC superstructures and for multi-cell culverts RCC box bridges are proposed. A preliminary span arrangement is proposed as shown in the **Table 2.6**. The span lengths of the new bridges are tentative and subject to further refinement.

Table 2.6: Proposed Preliminary Span Arrangement

SN	Existing bridge parameters		Total length	Spans	Span Length	New proposed parameters			Location
	Name of Bridge	Type of Bridge				Bridge type	No. of spans	Span lengths	
1	Sub way	RCC slab	6.7	1	6.7	Box culvert			
2	Guhye Khola (Jitgadi Khola)	RCC Girder	21.3	1	21.3	RCC	1	22	US
3	Narshing khola(Dry Nala)	RCC Girder	16.3	1	16.3	RCC	1	16	US
4	Dry Nala	RCC Girder	7.24	1	7.24	Box culvert			
5	Dry Nala	RCC slab	8.3	1	8.3	Box culvert			
6	pakhapani khola	RCC slab	9.6	3	3.2	Box culvert			
7	satgadi no 1	RCC slab	64.29	3	21.43	RCC	3	22	DS
8	satgadi no 2	RCC slab	28.6	2	14.3	PSC	1	30	DS
9	soila river	RCC slab	13.14	1	13.14	Box bridge	2	7	Twin
10	Rajpur khola	RCC slab	26.35	1	26.35	RCC	1	26	DS
11	bamaha khola	RCC slab	32.36	2	16.18	PSC	1	32	DS
12	Ghamaha khola	RCC slab	50.6	3	11,29,11	PSC	1	40	DS
13	Tulbuliya	RCC slab	42.9	3	14.3	PSC	1	42	DS
14	Marthirwa khola	RCC slab	16.35	1	16.35	RCC	1	16	DS
15	meghawa khola	RCC slab	21.2	1	21.2	RCC	1	22	DS
16	Inguria nadi	RCC slab	51.1	3	11,29,11	PSC	1	40	DS
17	Banarhwa Nadi	RCC slab	39.6	3	13.2	PSC	1	40	DS
18	Dry Nala	RCC slab	11.2	1	11.2	Box bridge	2	6	Twin
19	Pahila Nadi	RCC slab	46.2	3	15.4	RCC	3	16	DS
20	Dry Nala	RCC slab	10.62	1	10.62	Box bridge	2	6	Twin
21	Kanchan	RCC slab	63.84	3	21.28	RCC	3	22	DS
22	Kothi river	RCC slab	43	2	21.5	PSC	1	42	DS
23	Gageda khola	RCC slab	8.6	1	8.6	Box culvert			
24	Banganga	RCC slab	289.68	51	5.68	PSC	9	32	US
25	Kaila khola	RCC slab	93.60	3	31.20	PSC	3	32	DS
26	Balhundra khola	RCC slab	20.95	1	20.95	RCC	1	22	DS
27	Harkon Khola	RCC slab	20.90	1	20.90	RCC	1	22	DS
28	Dry Nala	RCC slab	21.45	1	21.45	RCC	1	22	DS
29	Kundra Khola	RCC slab	29.00	1	29.00	PSC	1	30	DS
30	Ghorai Nala khola	RCC slab	21.50	1	21.50	RCC	1	22	DS
31	Dry Nala	RCC slab	13.15	1	13.15	RCC	1	16	DS

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Culverts

All existing culverts will be tested for capacity adequacy and accordingly inferior culverts will be modified. New culverts will be designed for 50 years return period of flood. All existing culverts and Bridges less than 10 m span will be replaced by new RCC Box Culvert and Bridges.

Side Drain

Type and size of side drain will be selected on the basis of 20 years return period of flood. It may be open drain, covered drain, masonry drain or RCC drain as per site requirement and safety guidelines. Approximately 32620m side drain will be constructed.

Retaining Structures

Different types of retaining walls are proposed in the design of road such as Gabion wall, Stone Masonry wall, Reinforced Concrete wall and Geogrid Reinforced Retaining wall as required at site. Geogrid reinforced retaining wall is also known mechanically stabilized earth wall is the application of geogrid of different strength as per need for the stabilization of high fill embankment. Height of wall may be up to 15 m, so high tensile strength geogrid is used in this structure basically ultimate tensile strength ranging from 192 KN/m to 600 KN/m. All retaining structures are designed for design life of 50 years.

Protection Works

Protection works will be provided in all vulnerable areas like upstream and downstream areas of culverts, bridges, river banks, road sides and other special structures, all protection structures will be designed for design life of 50 years. Approximately gabion 12112 cum, gabion for river training 24458 cum, stone masonry 6255 cum will be required for protection work.

2.3.1 Community Health and Safety Measures in Road Design

Climate Change Adaptation Measures

The proposed hydraulic structures are designed based on the historical hydrological data and factoring climate change predictions. The proposed bridges are designed for 100-year return flows, culverts are designed for 50-year return flows, and side drains are returned for 25-year return flows. For all these flows, an additional 10% flows are added as climate change adaptation.

Structural Safety

The road is designed in accordance with the internal standards adopted for Asian Highways and national guidelines building codes on earth quakes. The project area falls in Category 5 of the seismic code.

Footbridge

At 6 locations, footbridges for pedestrian to cross the road are planned and designed for pedestrian safety aspects. Siting of the foot bridges identified is primarily located in the market and town area where schools, colleges, hospitals and other public facilities are used by pedestrians.

Road Safety Measures

The following road safety measures are considered in the design of the road, in the urban areas and at 16 intersections and 19 market areas:

- Raised pedestrian footpaths and cycle lanes in urban areas
- Installation of traffic lights in all major intersections along with zebra crossings and road humps
- Other safety measures such as provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots including pedestrian foot paths in market areas

2.3.2 Proposed Design Construction Approach and Methods

The general construction method of highway construction will be mechanical. Machines and excavators will be used throughout the length for the formation of road width and site clearance. There will be no blasting to be employed under the project. Disposal of spoil will be carried out using loader and trucks for haulage from excavated road alignment to proposed tipping site for safe disposal. Crusher plants and borrow pits will be established in proposed locations to obtain sand, soil and aggregates. Required safety and personal protection equipment such as helmets, visibility vests, gumboots, masks, gloves and other equipment will be provided to all labour workers during the time of construction. Prevention of landslides along the alignment will be carried out with the adoption civil structures, cutting of hill slopes with stable benching, bio-engineering application etc.

Construction activities will be carried out in piecemeal approach for the improvement of existing road. Construction contractor will not be allowed to stop or complete halt of existing traffic movement along the highway during the time of construction. Traffic mobilization will be maintained during construction within under construction section with one-way movement of traffic as applicable to site condition. However, construction contractors for each package will prepare traffic management plans and will seek approval from the construction supervision consultant prior to implementation.

2.4 Labour and Working Conditions

As per the WB ESS2, the project will employ direct workers, contracted workers, primary supply workers and community workers. About 500 workers, both skilled and unskilled, will be required throughout the construction period of five years. Out of which, about 300 will be outside workers (outside the project area), and 200 laborers are local, mostly un-skilled or semi-skilled labour. During the peak construction period, the requirement of local labour may increase up to 600.

2.5 Resource Requirements

2.5.1 Cut and Fill

Most of the burrowed soil suitable for embankment and subgrade will be used within the project area. Average distance for most of the borrow area sources from the nearest point on the project road. These deposits are accessible from the project road with little or no improvement of existing accesses. Quantities of soil material for use in the embankment and sub-grade construction of the project road are adequate from the project area. All the proposed bypasses will be constructed balancing cut and fill balance consideration.

Approximated required earthwork quantity of cutting and filling is given in **Table 2-7**.

Table 2.7: Approximated Earthworks Quantity

Cutting volume	272,883 cum
Filling Volume	1176517 cum

Sources of Construction Materials

Construction materials such as stone, coarse aggregates, sand, sub base, base course, and surface dressing/asphalt concrete chips are available in locally and others will be purchases from local market. The potential sources of construction materials (stone, coarse aggregates, sand) are given in **Table2.8**.

Table 2.8: Sources of the Construction Material

#	Name of the Source	Available Materials	Remark
1	Banganga River	Stone, Sand and aggregates, Chips for Asphalt Concrete	Existing quarry sites and licensed by GON
2	Tinau River	Sand and aggregates, Chips for Asphalt Concrete	Existing quarry sites and licensed by GON
3	Dano River	Sand and aggregates	Existing quarry sites and licensed by GON
4	Saljhundi	Sand and aggregates	Existing quarry sites and licensed by GON
5	Surahi River	Stone, Sand and aggregates, Chips for Asphalt Concrete	Existing quarry sites and licensed by GON

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

2.5.2 Construction Materials

Construction of road and bridges following material will be required. Construction materials such as stone, coarse aggregates, sand, sub base, base course, and surface dressing/asphalt concrete chips will be used from proposed quarry sites. Manufactured materials such as cement, steel and bitumen will be mostly sourced from local suppliers. The major construction material with quantity is given in **Table 2.9**.

Table 2.9: Estimation of Quantities of Construction Materials

Type of Material Required	Quantity of Material Required
Cement	51,200.00 Mt
Sand	61,160.00 Cum
Aggregate	284,400.00 Cum
Stone	68,320.00 Cum
Reinforcement	9,245.00 Mt
Structural Steel	1,075.00 Mt
Subbase	402,500.00 Cum
Base	259,500.00 Cum
Bitumen	1,125.00 Mt
Gabion Box	95,800.00 Sqm

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

2.5.3 Use of Energy and Construction Water

Gasoline and electrical energy will be used during the construction phase of the project to prevent pressure on natural forests in the project area. Contractor will avoid using fuelwood for the construction

purpose and for cooking purpose in labour camps. The energy required for the construction works is mainly kerosene, diesel and petrol. Diesel will be used for transportation of materials. Kerosene will be used for bitumen heating. Vehicles will use diesel or petrol supplied by the contractor from outside the project area. The required quantity is given in **Table 2.10**.

Table 2.10: Type and quantity of fuel required

Type of fuel	Quantity (liter)
Diesel	2,400,000 liter
Petrol	480,000 liter
Kerosene	2,050,000 liter

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

The technology used for the construction work will be both machine and labor based. Machine based method is mainly used for specialized works like material extraction from borrow/ quarry sites with use of heavy equipment like excavator, bulldozer, etc. Heavy equipment like excavator will also be used for earthwork excavation, vibrator for surface laying and compacting, use of distributor for laying and use of compactor for finishing bituminous seal, etc.

Water from the Badganga River, Bamaha River, Kothi River and its tributaries are likely to be used by the construction contractor during the time of construction.

2.6 Project Implementation Schedule and Resources

After completion of pre-implementation works such as land acquisition, vegetation clearance, etc., mobilization of contractors will be done. Construction of roads, major and minors bridges project is planned to start on 2022 and completion is estimated on 3 years (**Table 2.4**).

Project Cost for the construction of the Road and Bridges are based on an evaluation of the unit rates and quantities obtained from the designs, drawing and inventory. Costing has been carried out in the format using District rates and Norms approved by DoR. The total project cost for construction of road and bridges has been estimated to NRs. 15,777,239,424 including VAT.

TASK DESCRIPTION	Year 1				Year 2				Year 3				Year 4			
	Quarters															
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Construction Phase - Construction Activities																
Site Clearance																
Earthwork Excavation																
Cross Drainage Structures																
Bridges Construction																
Retaining Structures																
Side and Drainage Structures																
Road Pavement Structures																
Bio-engineering																
Environmental Activities																
Traffic Safety, Painting & Road Furniture																
DLP																

Figure 2.4: Construction Schedule of the Project

3 Legal, Regulatory and Administrative Framework

This chapter provides an overview of the national legislation and the World Bank Environmental and Social Management Framework that are relevant to the environmental and social assessment of the Project and actions that are taken (or to be taken) up by DOR to meet these requirements.

3.1 Applicable Environmental and Social Regulations

The Environment Protection Act (EPA), 2019 is mandatory and forms the basis for environmental assessment of the development project, and the Environmental Protection Rules (EPR), 2020 establishes the process to be followed during the preparation and approval of environmental assessment. Also, the Policy Document of DoR on Environmental Assessment in the Road Sector of Nepal (January 2000) requires an Environmental Assessment for national highways and main feeder roads for any kind of interventions such as rehabilitation, upgrading etc. As per Schedule 2, Rule 3, Transport sector E(8); Initial Environmental Examination (IEE) is required for upgrading of national highways or feeder roads of length 10-50 km. Currently, the IEE is in the process of approval and is anticipated to be cleared from MoPIT.

The project will be required to comply with relevant existing and environmental and social laws and regulations in Nepal throughout the life of the project. The policy, legal and institutional framework under which the project will be undertaken is outlined in Table 3.1.

Table 3-1: Key Provisions and Relevance of National Plans, Strategies, Policies, Acts/Rules and Regulations to BG ESIA

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
Plans			
1	15th 5 years' Development Plan of Nepal (2019-2024)	Enhancement in socio- economy with fast alleviation of poverty by high economic growth in next 5 years based on growth in agriculture, industrial and services sector with a slogan of "Generating Prosperity and Happiness".	Road development and connectivity is vital for the economic growth and overall development.
2	20 Year Road Plan, 2002-2022	The objective of the plan being the development of Strategic Road Networks (SRN), aligns with the priorities set out in the Tenth Five Year Plan (2002-2007) as that plan gives priority to constructing feeder and strategic roads connecting North to South encompassing all road development works.	This Act has been established to carry out regular, occasional, periodic and casual repair and maintenance works of roads and levy tolls on, and collect tolls from motor vehicles plying on the road.
3	Nepal National Biodiversity Action Plan, (2014-2020)	The overall goal is to significantly enhance the integrity of Nepal's ecological systems by 2020, thereby contributing to human well-being and sustainable development of the country. This is to be achieved through implementation of a number of sector specific and cross- sectoral strategies and priority actions	The Action Plan emphasizes that governance and legal/regulatory implementation is a major underlying factor behind deforestation and forest degradation.
Strategies			

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
5	Nature Conservational Natural Strategic Framework for Sustainable Development (2015-2030)	The Strategy stresses out the needs to mitigate the current and potential future effects of the pressure of transportation and other infrastructure development on the habitats of endangered flora and fauna based on the landscape concept.	The Strategy identifies legal and regulatory issues applicable for nature conservation, sustainable development and bio-diversity protection.
6	MoPIT's Five Year Strategic Plan for Prosperous Nepal through Roads, Rail and Transport Development, 2016/17-2021/22	Lays out map for Prosperous Nepal through Roads, Rails and Transport Development.	The strategy aims to reduce the number of casualties and road accidents on the highways and strategic roads
7	Sustainable Development Goals, (SDG) 2016-2030	SDG-9 aims for resilient infrastructure including roads, SDG 11- aims for inclusive, safe, resilient and sustainable human settlements SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss SDG17:to protect women and girls from violence	The SDG provisions for safer roads, biodiversity conservation and reduce gender disparity.
Policies			
8	Nepal National Environment Policy, 2076 BS(2019 AD)	The policy established the framework for the protection, control, and minimization of pollution, environmental mainstreaming, environmental justice, participation, sustainable development, good governance, and capacity development.	The Policy is aimed to ensure rights of the people to live in clean and healthy environment controlling pollution, managing solid waste, and enhancing greenery.
8	Forest Policy, (2015 AD)	The forest policy emphasizes the implementation of community and private forestry development, programs, national parks and conservation areas management programs, soil and watershed conservation program, management and development of medicinal plants and conservation of biological diversity.	The policy stresses conservation of endangered species and emphasizes to avoid forest destruction or chopping down the tree while constructing infrastructures during implementation of project other than forest sector.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
9	National Transport Policy, 2058 BS(2001AD)	The principal objective of this Policy is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal as a whole	The policy puts high priority in completing the construction of roads connecting all 77 District Headquarters of the Country to the main road network
10	Land Use Policy, 2072 (2015)	The objectives of the policy are to categorize or classify entire lands of the country into various Land Use Zones (LUZs), level wise division (Federal, Provincial and Local), and to ensure the use of Land and Land Resources(LLRs) on the basis of land use plans (LUPs) for protection of agricultural land and maintain beautiful, well-facilitated settlement and sustainable urbanization, forests areas including natural heritages, biodiversity and historical, cultural and religious, archaeological and areas of strategic importance	It ensures the participation of government and public agencies as well as the private sector by linking productivity, environmental balance and conservation, social and economic prosperity and poverty alleviation.
12	Land Acquisition, Resettlement and Rehabilitation Policy, 2071 BS(2015 AD)	The policy requires that expenses related to land acquisition, compensation and the implementation of resettlement and rehabilitation plans should be considered as project costs, underlining that compensation amount should be calculated on the market rate.	Policy outlines the needs to conduct an economic and social impact assessment of the development projects.
13	Public-Private Partnership Policy, 2072 BS (2015 AD)	The objectives of this policy are focused on serving to public interests in developing of infrastructures at the same time creating environment for private investment and use of private sector experience, managerial skills, competencies and technical skills for infrastructure development	The policy covers 6 development areas for partnerships including infrastructure and transport.
14	National Health Policy, 2076 (2019)	Universal health coverage including prevention, promotion, treatment, rehabilitation and palliation,	All kinds of pollution to be reduced that may impact general public and program to be implemented and developed along with relevant agencies in the basis of scientific planning.
Acts			
15	Environment Protection Act, 2076 BS (2019 AD)	The law contains several provisions to internalize environmental assessment system and to maintain a clean and healthy environment by minimizing the adverse impacts on human beings and other life forms and physical objects.	The act highlights that any development project, before its implementation has to pass through environmental assessment, which will be either BES, IEE or EIA depending upon the location, type and size of the projects.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
			The Act has included three tiers of provisions (Section 3.2.a) on conducting 'environmental study as brief environmental study (BES), IEE and EIA.
16	Public Road Act, 2031 BS(1974 AD)	The Public Road Act is the governing legislation for construction and operation of roads in Nepal.	The Act prohibits the construction of permanent structures (buildings) in a defined distance from the road, i.e. the road agency has the authority over everything within the right-of-way
17	Forest Act, 2076 BS(2019 AD)	Section 49 of the Act prohibits reclaiming lands, setting fires, grazing, removing or damaging forest products, felling trees or plants, wild animals hunting and extracting boulders, sand and soil from the National forest without the prior approval.	Section 42 of the act has made three provisions for using of forest areas: (i) the project should be of national priority sub-Section (1), (ii) there is no alternative other than to use the forest area sub-Section (1/2), and (iii) the project should not have significant impact on environment sub- Section (1)
18	Local Government Operation Act, 2074 BS (2017AD)	The Act provides the functions, rights and duties of local government such as Municipalities, rural municipalities and their wards.	This act empowers the local bodies for the conservation of soil, forest, and other natural resources and implements environmental conservation activities.
19	Soil and Water Conservation Act, 2039 BS (1982 AD)	Provisions to construct and maintain dams, embankment, terrace improvements, diversion channels and retaining walls, protect vegetation in landslide-prone areas and undertake a deforestation programs, and Regulate agricultural practices pertinent to soil and watershed conservations	Section 13 of the act empowers the authority to prohibit the commission of any acts that may cause soil- erosion or soil cutting in a land where any of the acts has been done under Section 4 and in vicinity of such land.
20	Plant Protection Act 2064 BS(2007 AD)	legal provisions for preventing the introduction, establishment, prevalence and spread of pests while importing and exporting plants and plant products, promoting trade in plants and plant products by adopting appropriate measures for their effective control	the act may impose the prohibitions/restrictions in the import of plant or plant product, transport from one district to another district of any plant or plant product.
21	Aquatic Life Protection Act, 2017BS(1960 AD)	Recognition of the value of wetlands and aquatic animals.	Section 3 of the act renders no person shall knowingly use any kind of electric current, explosive substance or poisonous substance with intention of catching and killing any aquatic animal in any water.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
22	Control of International Trade of Endangered Wild Fauna and Flora Act, 2074 BS(2017 AD)	The act prohibits on Trade or Transaction of Threatened or Vulnerable wild fauna or flora or specimen thereof	<i>The act ensues that no person shall purchase, sell, possess, use, plant, rear, captive breed, transport, import, export, or cause to be done so a threatened or vulnerable wild fauna or flora or a specimen, except of the cases when a license obtained</i>
23	Water Resources Act, 2049 BS(1992AD)	To make legal arrangements for determining beneficial uses of water resources, preventing environmental and other hazardous effects thereof and also keeping water resources free from pollutions.	Section 19 of the act clearly mentions that no one shall pollute water resource by way of using or putting any litter, industrial wastes, poison, chemical or toxic to the effect that the pollution tolerance limit of the water resource as prescribed pursuant to Sub- section (1) is exceeded.
24	Land Acquisition Act, 2034 BS(1977AD)	The Act is the main legislation to guide the involuntary acquisition of land in the country.	Government can acquire land at any place in any quantity by giving the compensation pursuant to the Act for the land required for any public purpose or for the operation of any development project initiated by government, authorized institution (sections 3 and 4).
25	Land Use Act, 2076 BS(2019 AD)	Section 4.1 of the act classifies lands into 10 categories such as agricultural, residential, industrial, commercial, mining and mineral, forest, river, stream, pond and wetland, public use, cultural and archaeological, and others.	The act provisions for the need for economic development and infrastructure building, among others to ensure that land is properly used and managed and that land set aside for one purpose is not used for other.
26	Labour Act, 2074 BS (2017AD)	The Act has been passed for provisions for the rights, interest, facilities and safety of workers and employees working in various sectors and thus ensures the good working conditions and welfare of the workers.	Section 11 (3) of the Labour Act provides for the employment contract and the matters to be covered under the employment contract <i>and the</i> Act requires the employment contract to include (a) remuneration, (b) benefits, and (c) terms of the employments of the Employee and such other matters as prescribed. Section 64 (1) states that the main employer must obtain the employees from licensed labour supplier.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
27	Child Labour (Prohibition and Regulation) Act, 2056 BS(2000AD)	The Child Labour (Prohibition and Regulation) Act 2000 is the main legal expedient to prohibit engaging children in factories, mines or similar risky activities and to make necessary provisions with regard to their health, security, services and facilities while engaging them in other activities.	Under the Section 3 of the Act, child having not attained the age of 14 years is strictly prohibited to be engaged in works as a laborer. Equally, under Section 4, engagement of child in works as a labourer against his/her will by way of persuasion, misrepresentation or by subjecting him/her to any influence or fear or threat or coercion or by any other means is prohibited. Under Section 6, in case any Enterprise, engaging a child in works, must get an approval from the concerned labour office or any authority or official prescribed by that office and form the fathers, mother or guardian of the child.
28	Act related to Children, 2075 BS (2018AD)	The act provisions the children's fundamental rights provided in the constitution, into a legislative provision, which then allows children to exercise their rights legally.	any child under the age of 14 are not allowed working in hazardous labour or the worst form of child labour
29	Road Board Act, 2058 BS(2002AD)	The act makes necessary provisions on having the roads repaired and maintained, making cost effective the expenditures to be incurred in repairing and maintaining the roads and making transparent and effective the repairing and maintenance works of the roads	The Act aims on providing sustainable fund for planned maintenance of the roads. The aim of planned maintenance is to keep existing maintainable roads in serviceable condition, reduce vehicle operating cost and provide more comfort to the road users.
Rules/Regulations			
30	Labour Rules, 2075 BS (2018 AD)	The Labour Rules demands the Employment Contract to cover (a) nature of employment, (b) primary work of the Employee and his/her position, (c) statement that the Employees' Service Rule will be integral part, (d) date, time, place of contract and its effective date, (e) Other important terms and conditions related to the work or service of the Employee	The Labour Rules regulate the Employee work schedule, providing rest period for certain female employees with submitting of certain certificates, determining the percentage of disability, associated with accident in the workplace, other issues relevant to sickness or accident while working, associated with occupational safety and health, etc.

S.N.	Plans, Policies, Acts, Rules/Regulations, Strategies	Key provisions	Relevance to BG ESIA
31	Water Resources Regulation, 2050 BS (1993 AD)	Measures are to be taken for the conservation of aquatic life and water-environment and for mitigating social and economic effects of the project in the concerned area.	It is mandatory under Rule 17(e) that appropriate measures should be taken to lessen the adverse effects due to the project on the overall environment

3.1.1 National Environmental Standards

National Ambient Air Quality Standard, 2069, The new National Ambient Air Quality Standard (NAAQS) 2012 that came into effect requires effective monitoring and collection of eight-hour and 24-hour samples of air pollutants like Total Suspended Particulates (TSP), Particulate Matter (PM10 and PM2.5), carbon monoxide, lead and ozone levels for at least 347 days out of a 365-day year. The NAAQS further states that no particular place should fail to monitor air samples for two consecutive days. TSP consist of solid and liquid particles in the air that are harmful to health while PM10 is an air particle with a volume less than 10 micron that can easily enter into the end of the respiratory tract and cause serious health impacts. Both TSP and PM10 are considered major air pollutants.

National Standard About Noise Level, 2069, The National Noise Standard 2012 that came into effect as per the rule 15 of Environmental Protection Regulation that requires effective monitoring and collection of Day-time and Night-time noise level permitted limits.

Nepal Vehicle Mass Emission Standard, 2069, Government of Nepal has prescribed different National standards for emissions from vehicles. There are limit values for emission of harmful gases from vehicles as mentioned in the standards.

National Drinking Water Quality Standards, 2005, Major tasks during monitoring to be performed by water supplier are cited as follows: Controlling regularly the quality to ascertain that the water supplied complies with the NDWQS; Periodic monitoring of all the components of the water supply system from the perspective of sanitation and risk to health; Proper supervision, inspection and maintenance as part of operation of the water supply systems; Development of necessary infrastructure like water quality testing laboratory and quality control. Following factors should be considered while monitoring: Type and quality of water sources i.e. surface water, springs, dug-wells, shallow wells, deep wells; Type and size of the water supply system (pipe system, treatment facilities); Local environmental settings (physical infrastructure, geography, etc.); Sanitation and hygienic condition surrounding the water supply system; Socio-economic environment at the local level; Site specific conditions for complying with the standards; User's opinion and suggestions regarding water quality; Health and Hygiene Information (information on water related diseases).

Based on all national documents stated above, this ESIA aligns and complies with the aforesaid national policy framework, indicating across various sectors and fields of expertise, the requirement for the assessment and effective management of environmental and social impacts related to the construction of the BG road.

3.2 Regulatory Institutions

Following institutions are responsible on Environmental and Social issues in the project.

Institution	Role and Responsibility on E&S issues
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Ministry of Physical Infrastructure and Transport (MoPIT)	MoPIT is the mother agency of the DoR and is mandated by the EP Act to review and approve IEEs for projects in public works and transport sector. It also reviews and endorses EIA reports for review and approval of the MoFE. The Ministry will also be the one to authorize the Project Management Office (PMU) to initiate preliminary action for land acquisition. This function is handled by the Environment and Social section under the Planning, Monitoring and Evaluation Division.
Department of Roads (DoR)/DCID	The DoR-DCID prepares and implements the ESIA/ESMP, which has to be reviewed and approved by the World Bank as the financing agency of the project. DoR-DCID is directly responsible for managing the E&S risks of individual projects under the program, i.e., from assessment, mitigation planning, implementation to monitoring.
Geo-Environment and Social Unit (GESU)	The focal point for the E&S risk management at of DoR is GESU. GESU provides advisory services to units of DoR on geological, environmental and social safeguards matters. Its main role is to prepare IEEs and EIAs for the DoR projects and have the map proved by the MoPIT in the case of IEEs and by the MoFE in the case of EIAs. Because of this role, GESU interacts with the Environment Unit of MoPIT as well as that of MoFE. GESU also undertakes compliance monitoring and auditing of projects.
EIA Unit under Ministry of Forest and Environment (MoFE)	This unit is tasks to undertake review and approve EIAs. It is reporting directly to the Ministry and not part of the Department of Environment. This unit convenes and engages multidisciplinary team to constitute the EIA Review Committee for each EIA submitted from approval. The EIA approvals typically include conditions which the project must comply or implement in addition to the EMP/ESMP
Department of Forestry and Soil Conservation (DoFSC)	DoFSC under the MoFE reviews and approves applications for RoW of road sections falling within areas classified as public forest. The DoFSC imposes conditions on the acquisition of right of way on forest lands, such as replacement of cut trees.
Department of Labour and Occupational Safety (DoLOS)	DoLOS under the Ministry of Labour and Social Security is currently not involved in the E&S risk management (i.e. it has no role in the EIA process) of development projects. Its role is mainly on the regulatory side. It can formulate and issue policies, rules and standards for OHS consistent with the law. As such, it can occasionally conduct monitoring and audit of workplaces, construction sites and offices of contractors and project management.
District Coordination Committees (DCC)	DCCs can regulate soil and water conservation activities. DCCs are also responsible for reviewing applications of eminent domain land acquisitions and confirming public use. It will be responsible for the issuance of land acquisition notice; the formation of Compensation Fixing Committee which would determine fair compensation; finalize the list of land owners to receive compensation; and receives grievances for submission to the Ministry of Home Affairs
Municipalities and Rural Municipalities	The municipalities are responsible to conduct public hearings of the EIA results and based on it endorse the project. The MoFE will not approve EIAs without the endorsement of municipalities. It will be responsible for approval of quarry borrow area.

3.2.1 Environmental Approvals, Permits and Clearances

The environmental approval, permit and clearance are important part of the project. The **Table 3-2** summarizes the responsible agency for environmental approval, permit and clearances to obtain for implementation of the construction works.

Table 3-2: Responsible Agency for Environmental Approval, permits and clearances

Purpose and status	Responsible party	Timeframe
ESIA Approval	GoN/WB	Before Signing of loan agreement
IEE Approval	MoPIT	Prior to construction
Permission to relocate affected electric poles along the alignment	Nepal Electricity Authority	Prior to construction
Private property and Acquisition of land	Land owners	Prior to construction
Land acquisition and land ownership issues	Department of Land Management and Archive, Ministry of Land Reform, Cooperatives and Poverty Alleviation	Prior to construction
Operation of quarry/borrow sites and watershed activities in community forest	Ministry of Forestry and Environment/DFO	Prior to, and during construction
Approval of tree cutting	MoFE/Department of Forest/Divisional Forest Office	Prior to, and during construction
Approval of Quarry/borrow operation in River	Municipality and DCC	Prior to, and during construction
Establishing for crusher plants batching plants	Municipality and DCC	Prior to, and during construction
Labour camps at private land	Land owners	Prior to, and during construction
Labour camps at public land	Municipality and DCC	Prior to, and during construction
Solid Waste Disposal Sites	Municipality	Prior to, and during construction

3.3 Relevant International Treaties

Nepal is a signatory party for many international conventions and other treaties. In the current review only those relevant to sustainable development were analyzed and have importance, because they address vital environmental and social issues, which are transboundary or global in nature such as pollution, climate change, biodiversity conservation, address social inequality and provide principles of environmental justice. The table below provides the brief review of international treaties and their provisions, relevant to environmental and social issues during road construction process and applicable in the case of ESIA of the BG road.

- As international policies, numbers of protocols and conventions have guided this study. These protocols and conventions are as mentioned below:
- Convention on Biological Diversity(CBD),1992
- Convention on International Trade in Endangered Species of Wild Fauna and Flora(CITES),(1973amended1979)
- Plant Protection Convention, 1952(Second Amendment,1997)
- World Heritage Convention, 1975

- United Nations Framework Convention on Climate change (UNFCCC), 1992.
- Strategic Approach to International Chemicals Management, 2006
- Convention on the Rights of the Child, 1989
- International Labour Organization Convention, 1998
- The United Nations Declaration on the Rights of Indigenous Peoples, UNDRIP, 2007

UN Declaration on the Elimination of Violence against Women, 1993

The above international protocols and conventions provide guidance on international best practice and focus on the conservation of natural resources and biological diversity, protecting and promoting environment as well as social issues including the group of conventions of the International Labour Organization and Gender Based Violence (GBV).

3.4 World Bank Environmental and Social Framework and Guidelines

The WB ESF sets out the WB's commitment to sustainable development and mandatory requirements for the bank finance projects. The Bank's ESF is used to assess and manage the environmental and social risks and impacts of the projects. ESSs which are designed to avoid, minimize, or reduce, mitigate and compensate/ offset the adverse environmental and social risks and impacts. The projects supported by the WB are required to meet the 10 ESSs as relevant to the project.

The ESIA will be undertaken in compliance with ESS1 requirements and other relevant ESSs, as follows:

ESS1: Assessment and Management of Environmental and Social Risks and Impacts: The ESIA will be prepared to assess all risks and impacts related to relevant standards (ESS2, ESS3, ESS4, ESS5, ESS6, ESS7, ESS8), including stakeholder engagement and assessment and management of environmental and social risks and impacts.

ESS2: Labor and Working Conditions: The ESIA will assess labor risks and working conditions on different types of project workers as per ESS2.

ESS3: Resource Efficiency and Pollution Prevention and Management: The ESIA will assess the risks and impacts related to ESS3, including identification on use of resource efficient technologies and techniques during construction and operation.

ESS4: Community Health and Safety: ESIA will assess the potential risks and impacts of the project in relation community health and safety.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement: The ESIA will assess the risks and impacts related to land acquisition as well as physical and economic displacement.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: The ESIA will collect baseline information on biodiversity, including identification and assessment of any critical habitats, natural habitats and modified habitats in accordance with ESS6 within the project area of influence (50-m ROW, 300-m direct impact area and 2-km indirect impact area).

ESS7: Indigenous Peoples: ESIA will identify the presence of indigenous people (IPs) with the project's Direct Area of Influence; collect baseline information on such populations; assess potential project impacts on such them; and provide recommendations for mitigating impacts and extending project benefits to such IPs.

ESS8: Cultural Heritage (CH): The cultural heritage baseline survey will be part of the ESIA and project impacts on CH will also be covered by the ESIA.

ESS 9 Financial Intermediaries: Since no financial intermediary is involved in this project, ESS9 is not applicable.

ESS10: Stakeholder Engagement and Information Disclosure: A Stakeholder Engagement Plan (SEP) developed for the overall project will be used to map out stakeholders and engage them all throughout the life of the project.

3.4.1 WBG General EHS Guidelines, 2007

The WBG General EHS Guidelines 2007 guides users on common EHS issues potentially applicable to all industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. The EHS guidelines also provide guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. The guideline highlights general approach to the management of EHS issues at the facility or project level. The guideline entails the inclusion of EHS considerations into corporate and facility- level business processes in an organized, hierarchical approach highlighting with the identification of EHS project hazards and associated risks. Further, the risk management strategies will incorporate engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences when impact avoidance is not feasible.

3.4.2 Environmental Health, and Safety Guidelines for Toll Roads, 2007

The EHS guidelines for Toll Roads include information relevant to construction, operation and maintenance of large, sealed road projects including associated bridges and overpasses. The guideline highlights the environmental issues specific to construction and operation of roads include the habitat alteration and fragmentation, storm-water, waste, noise, air emissions, and wastewater. The guidelines also highlight occupational and community health and safety and performance indicator monitoring of environment and occupational health and safety. The issues associated with the construction and operation of roads primarily include physical hazards, chemical hazards, and noise.

World Bank Good Practice Note on Road Safety

The World Bank is providing a series of Good Practice Notes (GPN) to accompany the ESF to support its implementation. This note focuses on addressing road safety on World Bank financed operations. GPNs are developed in partnership with specialists from inside and outside the Bank and are designed to be reviewed and updated periodically, when appropriate. This note should be read in conjunction with the ESF, including the Policy, the Environmental and Social Standards (ESS1-10) and the accompanying Guidance Notes for Borrowers.

3.4.3 Comparison of WB ESSs and National Regulations

Table 3-3 provides a comparison of the ESSs with national legislative framework and requirements. ESSs create mechanisms for the integration of environmental and social issues into decision making. They provide a set of specialized tools to support development. No financial intermediaries are involved in the BG Road project so ESS9 is not applicable. The comparative analysis of national regulatory frameworks with ESS1 to ESS8, and ESS10, found that the requirements in regulatory frameworks were aligned with ESSs, however the issues of GHG emission calculation, resource efficiency, community health and safety, and workers GRM have not been adequately addressed. These aspects are considered in different themes of impact assessment in line with international best practices, but not mandatory under existing regulatory frameworks.

Table 3-3: WB ESSs and Comparison with relevant National Laws

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
ESS 1: Assessment and management of Environmental and Social Risks and Impacts	ESS 1 requires the Borrower will assess, manage and monitor the environmental and social risks and impacts of the project throughout the project life cycle so as to meet the requirements of the ESSs in a manner and within a timeframe acceptable to the Bank. The Borrower will: (a) Conduct an environmental and social assessment of the proposed project, including stakeholder engagement; (b) Undertake stakeholder engagement and disclose appropriate information in accordance with ESS10; (c) Develop an ESCP, and implement all measures and Actions set out in the legal agreement including the ESCP; and (d) Conduct monitoring and reporting on the environmental and social performance.	Environment Protection Act (EPA), 2019; Environment Protection Regulation (EPR), 2020; and; National Environmental Impact Assessment Guidelines, 1993 are legal instruments for the requirements of Environmental and Social Assessment of any development projects.	The Schedules are based on activity type, threshold/size, as well as location. The potential risks associated with the project are omitted in GoN policy. No provision for associate project projects/activities; large projects can be split into smaller projects to avoid full ESIA study. The EA requirement in Nepal is primarily based on project's size, location and financial threshold; irrespective of the level of potential risks. It gives total freedom to proponent to design and implement EA on their own (for example all documents including Scoping, ToR, EIA reports are prepared by proponent and approved by concerned government offices. Experiences have shown that not all projects need for EA is justified based on size, location, thresholds. Scope of EIA may not cover all WB ESS.	- ESSA is prepared in compliance , for government clearance, separate IEE or EIA will be prepared as per the the standard - The ESMP to be prepared shall be made integral part of bidding document so that the Contractor (as for provision of services) shall adhere to the provisions prescribed in the ESMP during execution of the project.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
			EPA/EPR does not allow use of other types/forms of assessments. Does not emphasize hierarchy of measures in ES risk management planning	
ESS 2: Labour and Working Conditions	There are numbers of requirements of ESS2 under the following heading: • Working conditions and management of worker relationships; • Protecting the work force; • Grievance mechanism; • Occupational Health and Safety • Contracted workers; • Community workers; and; • Primary supply workers	Labor Act (2017) and Labor Rules 2018; and; Child Labor Act (2001) are legal instruments.	Current OHS legislation is not adequate (No separate legislation on OHS). Current OHS mandate is provided only in Chapter 12 of the Labor Act) Lack of industry-specific standards (DoLOS has so far issued only one directive: OHS Directive for Brick Workers)	• Labour Management Procedures (LMPs) is under draft stage and it will be implemented in the project implementation • Sub-project specific OHS plans will be developed by the contractors
ESS 3: Resource Efficiency and Pollution Prevention and Management	The Borrower shall consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention.	EPA (2019), EPR (2020), National Ambient Air Quality Standards (2003), Nepal Vehicle Mass Emission Standard (2012), National Ambient Sound Quality Standard (2012), Standard on Emission of Smoke in Air by New and Existing Diesel Generator (2012), National Water Quality Standard (2008), Tolerance Limits for Industrial Effluents to be discharged into Inland Surface Waters (2003),	Lack of suitable enforcement mechanisms for legislation on resource use efficiency in projects	• Resource efficiency and pollution prevention in any project activity will be captured in ESIA/ESMP preparation. • WBG EHS guidelines or/ National standards (depending on which one is stricter) related to environmental protection and resource efficiency will be complied with by the project.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
		The Solid Waste Management Act (2011), Solid Waste Management Rule (2013), Water Resources Act (1992), Water Resources Rules (1993), Drinking Water Regulation (1998), Drinking Water Quality Standards		
ESS 4: Community Health and Safety	There are numbers of requirements of ESS4 under the following headings: - Community health and safety and - Security personnel	The EPA identifies the direct and indirect human health impact as one of the components in assessing the effect of development projects. EPA Section 7: Nobody shall create pollution in such a manner as to cause significant adverse impacts on the environment or likely to be hazardous to public life and people's health.	- There is limited coverage as scope of ESIA's do not necessarily include community safety issues. - Public health legislation does not specifically impose requirements for development and infrastructure projects.	ESIA/ESMPs developed under the project will address all community health and safety issues that arise during execution and operation of the project.
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	There are number of requirements of ESS 5 under following headings: - General (Eligibility classification; Project design; Compensation and benefits for affected persons; Community engagement; Grievance mechanism; Planning and implementation); - Displacement (Physical displacement; Economic displacement); - Collaboration with other responsible agencies or subnational jurisdictions; and;	Land Acquisition Act (1977) Guthi Corporation Act (1976) Land Acquisition Guidelines (1989) Land Reform Act (1964) Clause 3 of the Land Acquisition Act states that any asset that is required for public purposes shall be acquired by providing compensation. Compensation Fixation Committee shall establish the Compensation rates. Guthi Corporation Act, 2033 (1976). Section 42 of this Act states that Guthi land (religious trust land) acquired for the purpose of the	- Does not require preparation of RAP - Does not allow for PAP consultation in the compensation options - Does not allow non-cash compensation options such as land-for-land and replacement homes, only "arrangements for rehabilitation" and "priority in employment". - Valuation of lost assets considers depreciation and hence not at replacement cost - Does not make mention of compensating non-titleholders	- The project shall be required to prepare vulnerability assessment and mitigation plan for the affected people that have impacts on their livelihood after losing the land. - A Resettlement Framework is being prepared to provide guidance for any resettlement activities. - The project shall assist those who have impacts on their livelihoods due to land acquisition by the project including tenants. - The lost assets need to be fully replaced and affected livelihoods restored.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
	Technical and financial assistance.	development shall be replaced with other land, than compensated in cash Compensation shall be provided for loss of crop damaged and income source.	(tenants, long-term land users, encroachers and squatters).	- Pragmatic livelihood assistance program shall be designed by the project. - The project shall develop alternative forms of compensation or assistance for adversely affected non-title holders, encroachers and squatters.
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	There are number of requirements of ESS 6 under the following headings: - General (Assessment of risks and impacts; - Conservation of biodiversity and habitats; - Habitats are classified as the Modified habitat; Natural habitat; and Critical habitat - Legally protected and internationally recognized areas of high biodiversity value; - Invasive alien species - Sustainable management of living natural resources and primary suppliers	Aquatic Animal Protection Act (1961), National Park and Wildlife Conservation Act (1973), National Park and Wildlife Conservation Regulations (1974), Soil and Watershed Conservation Act (1982), Himalayan National Park Regulation (1979), National Trust for Nature Conservation Act (1983), Forest Act (2019), Conservation Area Management Rules (1996), Buffer Zone Management Rules (1996), Plant Protection Act (2007)	- Natural habitats are not specifically required to be assessed in the EIA - Does not specifically require Biodiversity Management Plan even where biodiversity impact is found significant in the EIA	- All the provisions of relevant laws will be complied with by the project. - A separate Biodiversity Management Plan needs to be developed for project activities that have potential impacts on biodiversity and critical/natural habitats.
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved	There are numbers of requirements of ESS 7 under the following headings: General (Projects designed solely to benefit indigenous peoples/Sub-Saharan African	National Foundation for the Development of Indigenous Nationalities Act (2002), Local Self-	- The GoN encourages development programs to incorporate income generation schemes for IPs. - The provision of FPIC and broad community support in	An Indigenous People Development Framework (IPDF) is being prepared to provide guidance to mitigate any impacts on IPs.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
Traditional Local Communities	historically underserved traditional local communities; Projects where indigenous peoples/Sub-Saharan African historically underserved traditional local communities are not the sole beneficiaries; Avoidance of adverse impacts; Mitigation and development benefits; Meaningful consultation tailored to indigenous peoples/Sub-Saharan African historically underserved traditional local communities; • Circumstances requiring free, prior and informed consent, FPIC (Impacts on lands and natural resources subject to traditional ownership or under customary use or occupation; Relocation of indigenous peoples/ Sub-Saharan African historically underserved traditional local communities from lands and natural resources subject to traditional ownership or under customary use or occupation; Cultural heritage); Grievance mechanism; and; Indigenous peoples/Sub-Saharan African historically underserved traditional local	Governance Act (1999), ILO Convention 169 (2007) The GoN encourages to include and consider IPLC's concerns in each and every development and infrastructure programs and formulate a plan or mechanism to incorporate income generation program targeted to IPLC.	relation to IPs is absent. Nonetheless, the GoN has ratified ILO 169 and the United Nations Declaration of Rights of Indigenous People (UNDRIP). • The GoN is in the process of preparing National Action Plan to implement these international commitments.	• The project shall seek to maximize the ability of Adivasi/ Janajati to benefit from the project by: a. creating an environment for social inclusion; b. enabling their participation in policy discussions and decision making; c. promoting their culture, language and knowledge through different project activities.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
	communities and broader development planning.			
ESS 8: Cultural Heritage	There are numbers of requirements of ESS 8 under the following headings: • General • Stakeholder consultation and identification of cultural heritage (Confidentiality; Stakeholders' access); • Legally protected cultural heritage areas; • Provisions for specific types of cultural heritage (Archaeological sites and material; Built heritage; Natural features with cultural significance; Movable cultural heritage); and; • Commercial use of cultural heritage	• The EPA (2019) and EPR (2020) provision that physical and cultural resources shall not be disturbed or damaged without the prior approval of concerned authority. • Ancient Monument Act (1956) have provisions on cultural heritage	• Does not include intangible cultural heritage • Does not provide for the development of Cultural Heritage Plan • Does not provide for the application of globally recognized practices in the study, documentation and protection of cultural heritage • Does not provide for adoption of chance find procedures	• The ESMF has incorporated "Chance Finds" provisions and requirements • ESMPs to be developed under the project will aim to address any issues of cultural heritage that may be affected by the execution and operation of the project. • During the drafting stage of this ESMF, not all cultural heritage is identified and documented. However, through a collaborative approach community will be consulted in identifying cultural heritage sites with local significance/importance and documented and follow CHP-CFP.
ESS 10: Stakeholder Engagement and Information Disclosure	There are numbers of requirements of ESS 10 under the following headings: • Engagement during project preparation (Stakeholder identification and analysis; Stakeholder Engagement Plan; Information disclosure; Meaningful consultation); • Engagement during project implementation and external reporting; \Grievance mechanism; and;	• Prevailing national policies including EPA 2019 and EPR 2020 has envisaged the stakeholder engagement at different stage of the project design and implementation. Stakeholder consultation, disclosure and grievance hearing system are provisioned.	• Does not require stakeholder analysis and preparation of stakeholder engagement plan • Does not provide for continuous stakeholder engagement/consultations beyond EIA process during construction and operation phase	• The project has prepared a Stakeholder Engagement Plan (SEP) to ensure that stakeholder engagement activities are effective and meaningful consultation is carried out including guideline for establishing a comprehensive GRM with clear, safe and accessible procedures to identify and respond to grievances, including SEA/SH, cases.

World Bank ESS requirements		Nepal's policy framework and requirements	Gaps between ESSs and GoN & legal and policy requirements	Gap-Bridging Measures
ESS	Requirements			
	Organizational capacity and commitment			

4 Baseline Environment

This chapter defines the project influence area and presents a detailed overview of the physical, biological, and socio-economic environment within the project influence area, and results of the primary investigations carried out under the Project.

4.1 Zone of Influence (Zoi)

The project affected municipalities and rural municipalities are considered Zoi of the project. The Zoi of the project area has been categorized as Direct Impact Area (DIA) and Indirect Impact Area (IIA).

The Direct IA of the project includes all the areas where activities related to the construction will take place. The areas within the 25 m on either side from the center of the road (50m corridor) is considered as the DIA, because land use change will occur there and land and property acquisition will take place within this area. During operation stage this area will be impacted by the increased level of traffic volume, which can have repercussions on the safety of people.

Further 150m on either side from the centre of the road will have a greater likelihood of impact on human population, private land and resources and impacts on physical, biological as well as socio-economic and cultural environment and, thus, it is considered as high impact area. The direct impact zone has been calculated as extent of direct road effect on environment, which is from 100 to 200 m from the road (each side), we took an average 150 m each side, because the BG road passes mostly through plain area with agriculture land, settlement and dense vegetation. Dense vegetation itself mitigates negative impacts of dust, noise and disturbances. As operation of burrow sites, quarry sites, crusher plants, batching plants, spoils management sites, campsites, etc. will be included within the area. In addition, labour related issues affect the socio-economic and cultural environment of the project area.

The adjacent areas within 1 kilometre either side of road alignment are considered as the Indirect Impact Area (IIA). In this area, physical and biological environment will experience impacts during the time of construction.

Besides, indirect impacts will appear as cumulative effects during operation stage in the form of adverse impacts linked to better access to the area such as increased poaching, fodder collection, deforestation, unplanned human encroachment along the road and other similar activities. Impacts inadvertently during construction phase are likely in these areas due to various construction activities.

Figure 4-1 presents the direct impact zone and indirect impact zone of the project.

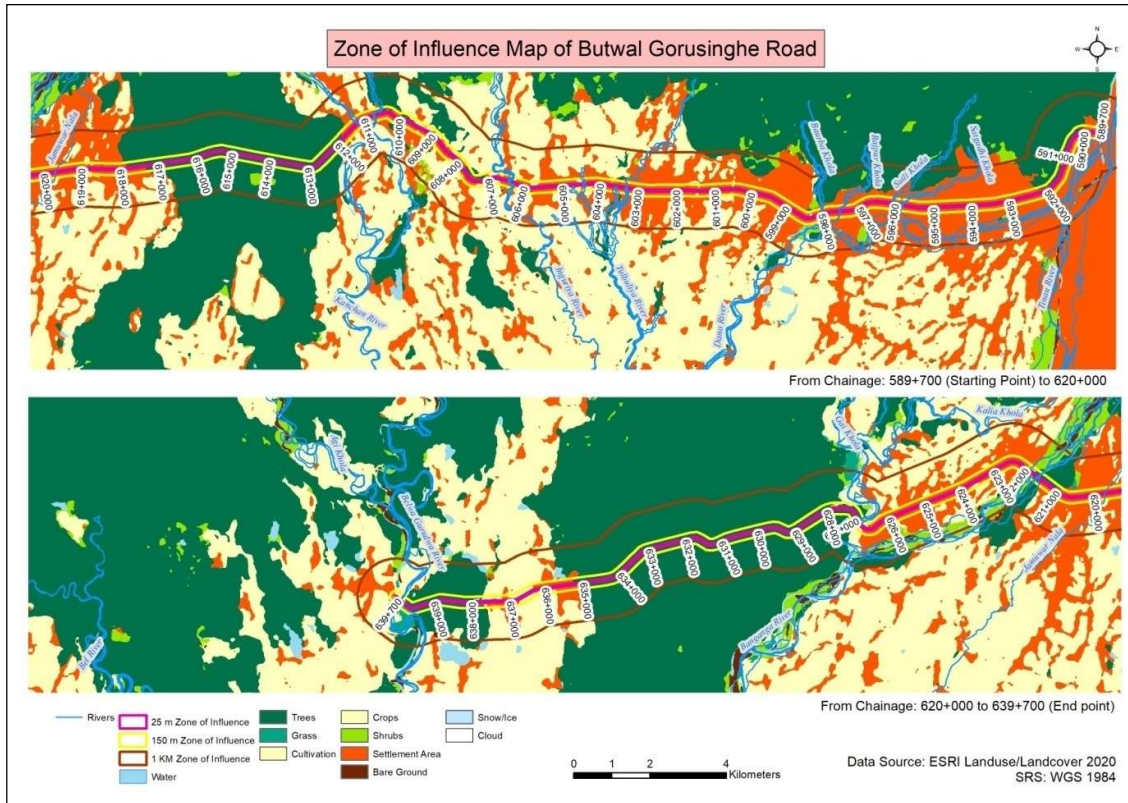


Figure 4.1: Direct impact and Indirect Impact area along the Road

4.2 Physical Environment

4.2.1 Terrain

The project area lies in Siwalik and Terai, with an elevation of 117 to 158m amsl (above mean sea level). The alignment begins from the end of the Tinau Bridge at Butwal at an elevation of 149m amsl and ends at Gorusinghe (Budhi) at an elevation of 117 m amsl. The maximum elevation is 1158m amsl at Basgadhi. The road lies in Kapilbastu and Rupandehi District and the length is 50 km. The project lies about 300 km south-west of Kathmandu, 250 km south of Pokhara and 120 km west of Chitwan. Rupandehi and Kapilbastu district lies in outer Terai whereas. The alignment from chainage 589+700 Tinau bridge to 591+400 falls under the foothills of the Shiwalik range whereas the remaining lies in Gangetic plain (Terai).

Rupandehi is a part of Lumbini Province in south western Terai of Nepal bordering India in South, and Palpa, Nawalparasi and Kapilvastu in the North, East and West respectively. It lies within the coordinates 27°20' N to 27°45' N and 83°10' E to 83°40' E. The combination of Terai plain (100 masl) and Chure hills region (1219masl) gives the district diverse geography within an area of 1360 sq. km.

Kapilvastu district lies in Lumbini Province, on south-western Nepal between coordinates 27°028' to 27°055' N and 82°042' to 83°014' E. Geographically the district can be divided into the low land plains of Terai and the low Chure hills. The district is situated at a elevation of 93 masl to 1,491 masl. The Topographical Map showing road alignment has been given in **Figure 4-2**.

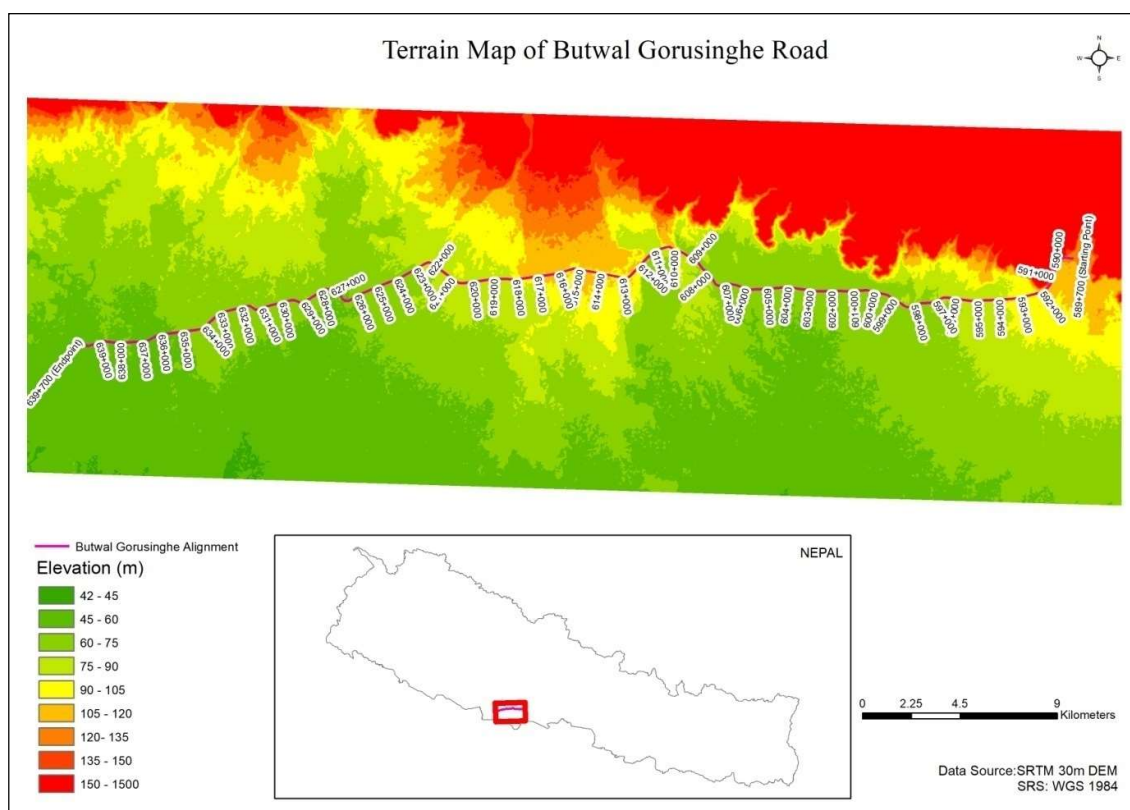


Figure 4.2: Topo Map of BG Road

4.2.2 Land Use Pattern

The existing land use patterns along the BG road alignment are predominantly urban and peri-urban settlements followed by agriculture farm lands, forest, barren, and water bodies. The area along the highway is highly populated, which is confirmed by analysis of land use in the road corridor with 60.8% of total area, occupied by settlements with agricultural land (mostly villages and small towns located along the highway), 15.8% agriculture land, 20.6% forest/grass land and the remaining are water bodies and others. However, the 50 RoW (25m on both sides from centre line) of road is almost clear and the existing formation width of the road is 7 to 12m, which means road upgrading will occur requiring minimal additional land area. With reference to the preliminary design, there is no additional forest area and agricultural land needed beyond RoW. The ROW's land has already been transferred to DoR/GoN.

The land use patterns following the upgrading of existing BG Road are likely to undergo a substantial transition from agricultural farm lands and open fields to more residential and commercial uses with the later becoming more prevalent leading to an increase in property value and positive impact on local community. As it can be seen from **Figure 4-3**, the land along the road is mostly occupied by agriculture with some forest patches in the indirect impact area.

Butwal Gorusinghe Road Section with Landuse

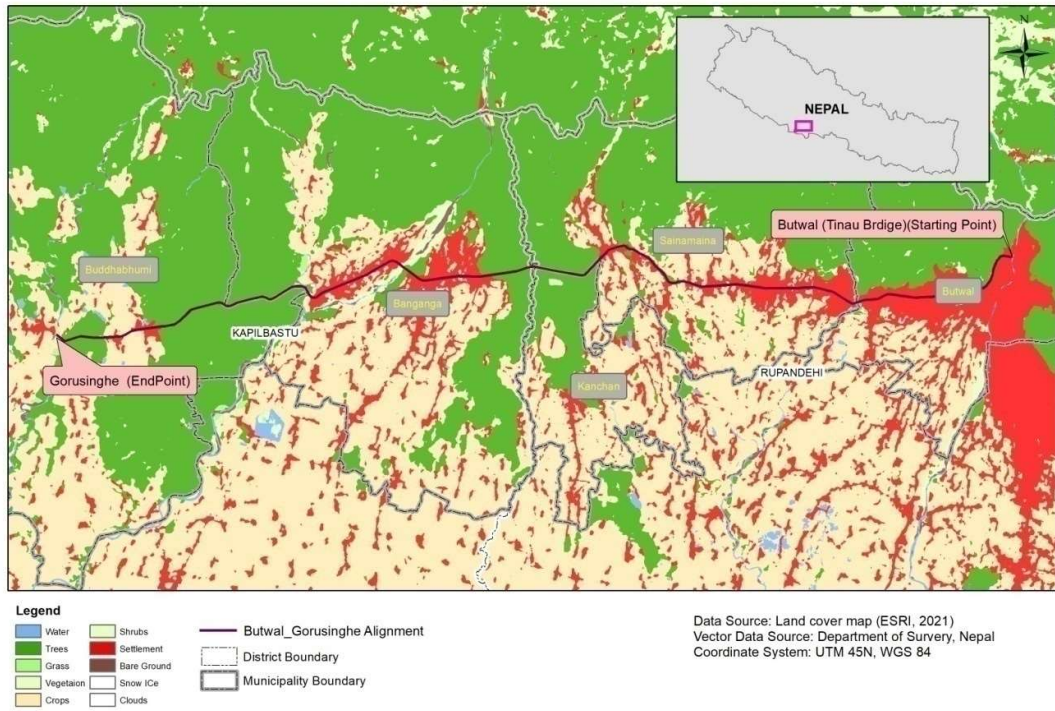


Figure 4.3:: Landuse Map of Project Area



Figure 4.4: Settlement, Agricultural field, Forests and Water bodies in the Road corridor

Affected land use calculation is conducted within the ROW (25 m on both sides of the road), along direct impact area (DIA) of the road. Land uses along the impact zones are settlement agricultural

land, forest and barren areas and waterbodies. Approximately 236.12 ha land is needed to be acquired for the implementation of the project road and bridges. This land includes forest land and barren land (28.46 ha), agriculture land (35.32 ha) and settlement area and agricultural land (132.67 ha).

Land use pattern of project affected district is described briefly in the table below:

Table 4-1: Land Use Pattern of Project District

District	Forest Area (Ha)	Pasture Land(Ha)	Agricultural land/grass (Ha)	Others (Ha)	Total (Ha)
Kapilbastu	77838	933	93855	3068	175,694
Rupandehi	39332	1005	96798	3098	140,233
Total	117,170	1,938	190,653	6,166	475,105
District	Forest Area (Ha)	Pasture Land(Ha)	Agricultural land/grass (Ha)	Others (Ha)	Total (Ha)

Source: Environment Statistic of Nepal, Central Bureau of Statistics, 2013

Compare with the district forests cover and agriculture land, forest land loss in the RoW is about 0.024% and agriculture land loss is 0.088%.

The detail Chainage wise land use patterns are presented in **Table4-2**.

Table 4-2: Land Use Pattern of Project District

Chainage		Length (m)	Land use Type
From	To		
589+700	591+230	1600	Settlement
591+240	609+500	18260	Settlement
609+500	610+700	1200	Forest + Agriculture land, Settlement
610+700	611+870	1170	Settlement
611+870	617+730	5860	Forest
617+730	617+900	170	Settlement
611+900	618+000	6100	Agriculture Land
618+000	621+200	3200	Settlement
621+200	621+600	400	Agriculture Land
621+600	621+860	260	Forest
622+120	626+840	4720	Settlement
626+840	626+970	130	Agriculture Land

626+970	627+100	130	Forest
627+200	635+200	8000	Forest
635+200	636+420	1220	Settlement
636+420	637+000	580	Agriculture Land
637+000	637+720	720	Agriculture Land
637+720	639+000	1280	Forest
639+000	639+050	50	Settlement
639+050	639+700	650	Forest, Barren Land

Source: Field Survey 2021

1.1.1 Climate

The road lies in a tropical and sub-tropical climate with humid and hot characteristic. In general, the rainy season starts in June and ends in September. About 80% of the rainfall occurs in this season. In the dry season, the Northwest wind brings dry and cold wind bearing little moisture and accounts for the remaining 20% of the annual rainfall.

- Winter – November – Feb
- Spring – March to May
- Summer – June – August
- Autumn –September - November

Temperature

Based on the temperature data of Kapilbastu (Taulihawa) and Rupandehi (Bhairahawa Airport) from 2007-2016. The average minimum temperature of Kapilbastu is 18.79°C and the maximum temperature is 30.93°C. The average minimum temperature of Rupandehi is 19.04°C and the average maximum temperature is 31.08°C.

Table 4-3: Table showing Average Minimum and Maximum Temperature of

SN	Districts	Station Name	Station No.	Average Min Temperature	Average Max Temperature
1	Rupandehi	Bhairahawa Airport	705	19.04	31.08
2	Kapilbastu	Taulihawa	716	18.79	30.93

Rainfall

The average annual rainfall in Rupandehi and Kapilbastu District is 2501mm, 1622 mm respectively. There is high rainfall in the month of July and gradually decreases in the month of August to October.

Table 4-4: Rainfall Stations in the Project Area

Station name	Road Section	Index No.	Record Length, years	Rainfalls, mm	
				Annual	Monsoon
Butwal	0+000 to 25+563	0703	59	2501	2209

Station name	Road Section	Index No.	Record Length, years	Rainfalls, mm	
				Annual	Monsoon
Taulihawa	25+563to 50+000	0716	45	1622	1411

4.2.3 Hydrology

All major rivers in the project area are characterized by large floods with heavy suspended loads during the monsoon from June to September. Most of the major rivers in project area are perennial. However some rivers have low flows during the dry period. Some small rivers and streams originated from Siwalik Hills are prone to flash floods during the monsoon but have no flow rest of the time.

The project alignment starts from the banks of the Tinau River.

The meandering nature of many rivers signifies the unstable banks, hence river bank cutting and scouring is eminent in most of the rivers. The banks are not defined in most cases. Moreover, the high ground water table and the flat terrain exacerbate the situation during flooding. The surrounding areas of these rivers are prone to flood every year.

A list of major rivers and rivulets (*Kholas* and *Kholsies*) crossed by the road alignment is presented in **Table 4-5**. Banganga River is a major river in the project. It is characterized by large floods with heavy suspended loads during the monsoon from June to September. Some small rivers and streams that originated from Siwalik Hills are prone to flash floods during the monsoon but have no flow rest of the time.

Catchments of the project area have been delineated by GIS and checked by overlapping them on Google Earth Professional. Figure 4.5 shows the catchment area of the river of the BG road.

Figure 4-5: Catchment area of River of Butwal-Gorusinghe Road

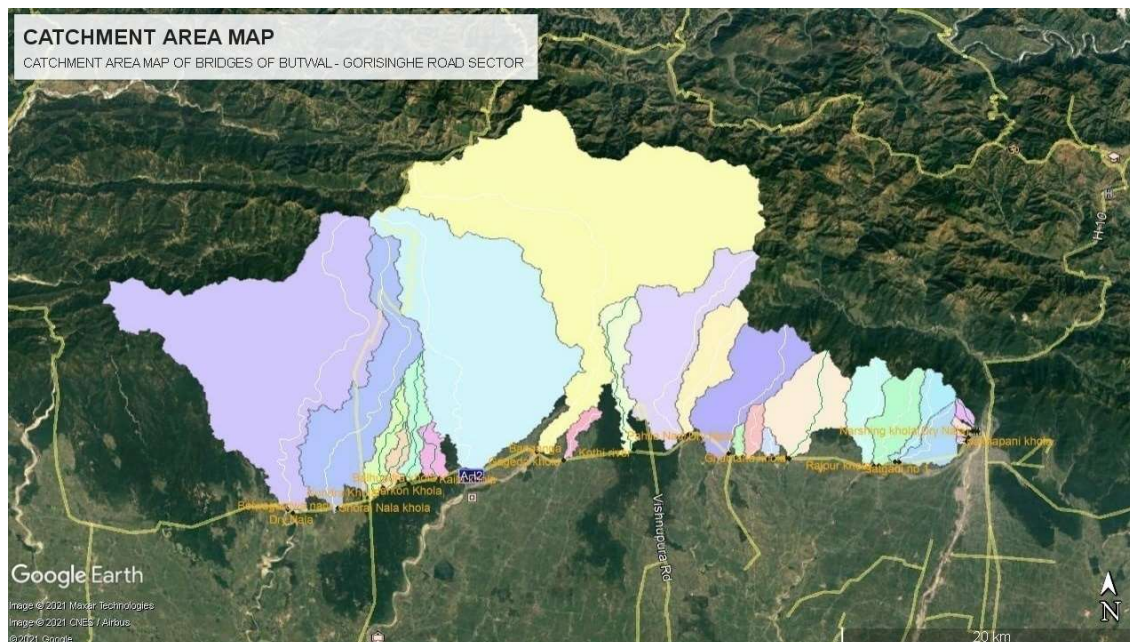


Table 4-5: List of Rivers along the road

SN	Name of River	Existing Type of Bridge Over the River	Length of Existing Bridge (m)
1	Sub way	RCC slab	6.70
2	Jitgadi Khola	RCC Girder	21.30
3	Narshing khola(Dry Nala)	RCC Girder	16.30
4	Dry Nala	RCC Girder	7.24
5	Dry Nala	RCC slab	8.30
6	Pakhapani	RCC slab	9.60
7	Satgadi no 1	RCC slab	64.29
8	Satgadi no 2	RCC slab	28.60
9	Soila river	RCC slab	13.14
10	Rajpur khola	RCC slab	26.35
11	Bamaha khola	RCC slab	32.36
12	Ghamaha khola	RCC slab	50.60
13	Tulbuliya	RCC slab	42.90
14	Marthirwa khola	RCC slab	16.35
15	Meghawa khola	RCC slab	21.20
16	Inguria nadi	RCC slab	51.10
17	Banarhwa Nadi	RCC slab	39.60
18	Dry Nala	RCC slab	11.20
19	Pahila Nadi	RCC slab	46.20
20	Dry Nala	RCC slab	10.62
21	Kanchan	RCC slab	63.84
22	Kothi river	RCC slab	43.00
23	Gageda khola	RCC slab	8.60
24	Banganga	RCC slab	289.68
25	Kaila khola	RCC slab	93.60
26	Balhundra khola	RCC slab	20.95
27	Harkon Khola	RCC slab	20.90
28	Dry Nala	RCC slab	21.45
29	Kundra Khola	RCC slab	29.00
30	Ghorai Nala khola	RCC slab	21.50
31	Dry Nala	RCC slab	13.15

Source: Feasibility Report of Butwal –Gorusinghe Road, 2021

Flood Estimation for Drainage Structures

Bridges will be designed taking 100 years return period, DoR (2017) estimated the design flood discharge passing through the existing bridges using rational formula and were compared with flood discharge estimated using several empirical methods **Table 4-6**.

Cross drains will be designed for 50 years return period flood (DoR, 2017). Using rational formula for discharge estimation of cross drains, this study pointed out the necessity of new crossing structures along with replacing existing culverts that are inadequate to pass design discharge. DoR (2017) also found that the existing side drains are more or less adequate for 25 years return period flood but might be increased for an increased return period of flood.

Table 4-6: Estimation of Design Floods for Rivers of Butwal Gorusinghe Road Section

Name of River/Stream	A, km ²	100 Year Design Flood (Q ₁₀₀), m ³ /s				
		DHM 2004	MHSP 1997	Tinau HSC	PCJ 1996	Final
SUB_WAY						
JITGADI_KHOLA	1.87	32.5	34	18	50.5	50.5
NARSHING_DRY_NALA	0.73	16.5	17.1	7	24.6	24.6
DRY_NALA	0.36	9.9	10.2	3.5	15.4	15.4
DRY_NALA	0.18	6	6.2	1.7	8.5	8.5
PAKHAPANI	0.12	4.5	4.6	1.2	5.9	5.9
SATGADI_NO_1	8.11	93.4	99.2	77.9	140.9	140.9
SATGADI_NO_2	6.97	83.8	88.8	67	130.1	130.1
RAJPUR_KHOLA	14	138.4	147.7	134.5	203.7	203.7
BAMAHA_KHOLA	12.5	127.6	136	120.1	185.4	185.4
GHAMAHA_KHOLA	16.3	154.4	165.1	156.6	231.2	231.2
TULBULIYA	8.71	98.4	104.5	83.7	145.5	145.5
MARTHIRWA_KHOLA	1.31	25.1	26.2	12.6	36.9	36.9
MEGHAWA_KHOLA	0.99	20.6	21.4	9.5	28.7	28.7
INGURIA_NADI	24.5	207.1	222.3	235.4	320.4	320.4
BANARHWA_NADI	8.87	99.6	105.9	85.2	146.6	146.6
PAHILA_NADI	16.8	157.8	168.8	161.4	237.2	237.2
DRY_NALA	1.4	26.4	27.5	13.5	39.2	39.2
KANCHAN	47	331	357.7	451.6	522.2	522.2
KOTHI_RIVER	12.9	130.5	139.2	123.9	190.3	190.3
GAGEDA_KHOLA	1.42	26.6	27.8	13.6	39.7	39.7
BANGANGA	198	932.3	1021.9	1902.3	1505	1902.3
KAILA_KHOLA	133	700.1	764.3	1277.8	1072	1277.8
BALHUNDRA_KHOLA	4.86	64.6	68.2	46.7	102.1	102.1
HARKON_KHOLA	7.84	91.2	96.8	75.3	138.6	138.6
DRY_NALA	3.91	55.3	58.2	37.6	88.1	88.1
KUNDRA_KHOLA	42.1	305.8	330	404.5	482.5	482.5
GHORAI_NALA_KHOLA	22.8	196.6	210.9	219.1	303.4	303.4
DRY_NALA	0.12	4.5	4.6	1.2	5.9	5.9

Note: DHM= Department of Hydrology and Meteorology, A=Area, km²= Square Kilometer

Existing and Proposed Side Drains

Most of the existing side drains are made of stone or brick masonry in this section. However in urban areas there are some RCC side drains was also constructed. The types of side drains with fixed shape are recommended for new construction. The size and length is determined based on the design flood of 25 years.

Groundwater

The project area lies in the Terai region. This area has abundant groundwater resources and has fertile soil. Groundwater is the main source of water drinking water supply and irrigation for the development of the agriculture sector. In the study area, the aquifers are mainly recharged by rainwater infiltration perennial streams like Tinau River, Badganga River and their seasonal tributaries. The northern part of the district covers part of the Churiya Range whose immediate southern premises the Bhabar Zone consists of coarse materials (gravels and boulders) forms major recharge zone. Thick vegetation cover in most part of the Bhabar Zone also help for groundwater recharging. The seasonal range of depth to water table in the Terai varies from 0 to 10m. Groundwater is also the major source of water supply in the project area.

4.2.4 Geology

The road alignment falls on the sediment of the Gangetic Plain (Upper Terai) and rocks of Siwalik Group of western Nepal. From 589+700 to 591+400 falls foothills of Siwalik, and remaining covers the sediments of the Gangetic Plain.

The area consists of very coarse to coarse sediments developing gently sloping surface toward south. Most of the south flowing rivers originated in the hinterland area manifest braided river pattern. Debris flows and riverbank erosion occurred in the Tinau River, Kaila Khola, Kanchan, Kothi, Banganga, Satgadi rivers. Generally, debris flows, riverbank erosion and river channel shifting are the major hazardous events in this area. The alignment passes on the loose sediment of the Upper Terai and Middle Terai (Fig. 4-6). The Upper Terai is covered by clay and sands but superficially the zone is covered by a thin layer of residual soil.



Figure 4.5: General north-south topographical profile across the East-West Highway, which shows the various geomorphic zones

Between Butwal to Basgadi

From Butwal to Basgadi is covered by cultivated land and forest. This section falls in the Upper Terai zone. On the surface, the alignment composed of residual soil and thickness of the residual as top soil is considered as less than 10 m then thick boulder bed with cobble and sands of the Upper Terai zone can be found. Landslide, gully erosion and old slide scarp are observed from Chainage 590+000 to 591+000.

Between Basgadi and Pipara

Between Basgadi and Pipara, this section belongs partly in the Upper Terai zone and partly in the sediments of the Middle Terai zone. The Middle Terai zone is composed of sands and silt as well as clay somewhere thick boulder beds can be met. This area is more stable.

Between Pipara to Gorusinghe

From Pipara to Gorusinghe, the area is covered by also the Middle Terai zone and composed of thick beds of sands and clays. But on the surface thick beds of topsoil has covered the loose sediments of the Middle Terai zone. The area is covered by cultivated land and settlement and forest. This area is also more stable.

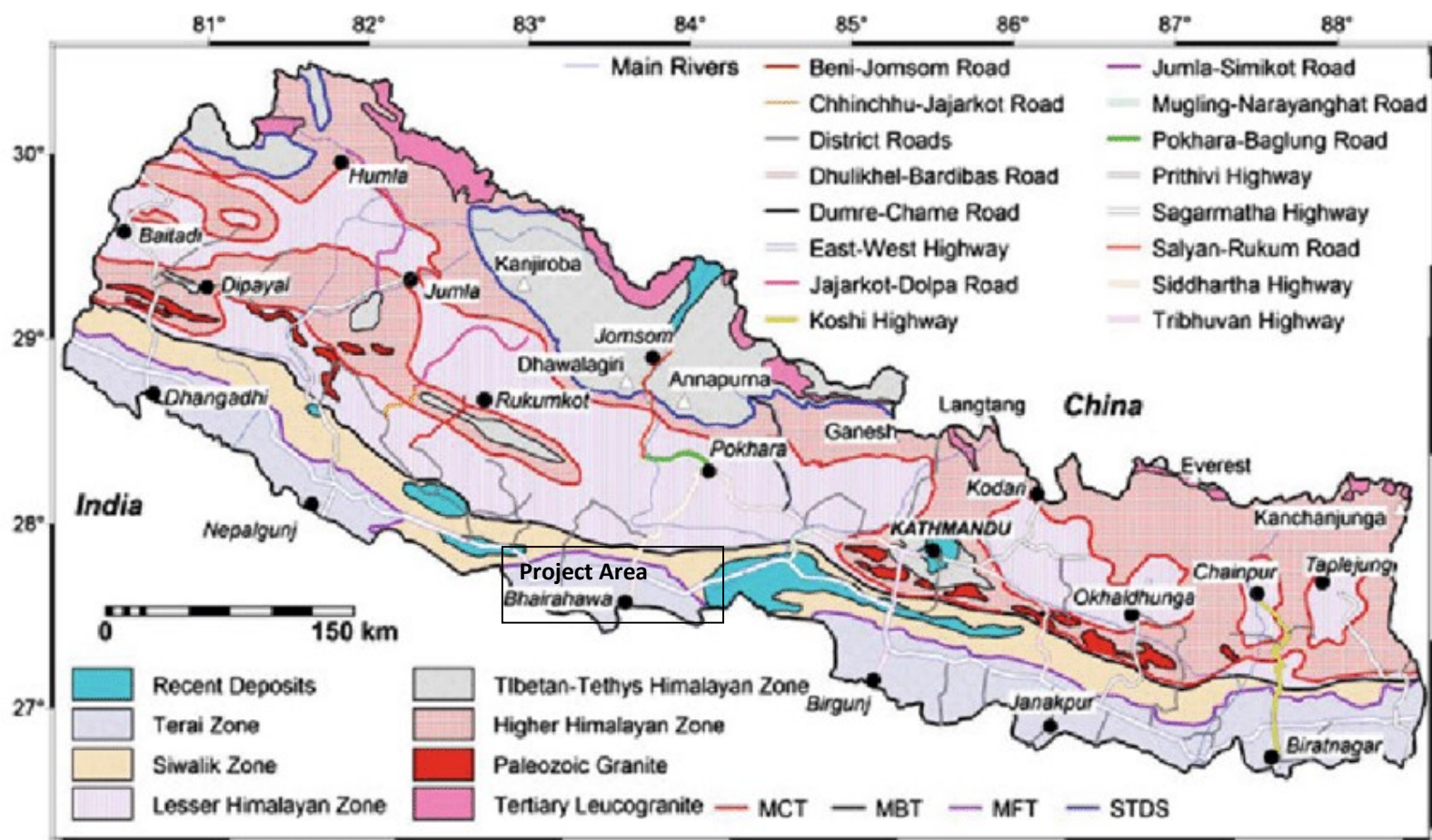


Figure 4.6: Geological Map of Nepal

The geological characteristics of the proposed bridge sites along the road corridor from Butwal to Goringhwa are described in **Table 4-7**.

Table 4-7: *Geological characteristics of major bridge sites with respect to chainage along the road corridor from Butwal to Goringhwa*

Chainage	Name of Bridge/River	Geological and geomorphological characteristics
595+450	Satgadi no 1	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BMS(Gravel) • rock at depth- No • river flow direction- flow from north to south • Straight River
603+000	Ghamaha River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BMS(Gravel) • rock at depth- No • river flow direction - flow from north to south • Riparian around the channel
610+425	Pahila River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • Small Gully • Fluvial deposits
610+510	Dry Nala	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • Small Gully • Fluvial Deposits
610+820	Kanchan River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BMS(Sand and Gravel)
614+685	Kothi River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • Narrow River • rock at depth – No • river flow direction- north to South flow • Forest area
619+440	Gageda River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • Meandering River • rock at depth – No • river flow direction- north to south flow • Fluvial sediments

Chainage	Name of Bridge/River	Geological and geomorphological characteristics
621+420	Banganga River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BMS(Sand and Gravel)
626+600	Kaila khola River	Depth to bed rock/Soil at foundation and abutment: • sediment cover – BMS(Sand and Gravel)
628+885	Balhundra River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • river flow direction- north to south flow • Forest area
631+000	Harkon River	Depth to Soil/bed rock at foundation and abutment: • sediment cover – Boulder mixed soil (Sand and Gravel) • rock at depth – No • river flow direction- North to South flow • Straight river near the bridge site area • Narrow River channel
633+800	Dry Nala	Depth to Soil/bed rock at foundation and abutment: • sediment cover – BMS (Sand) • rock at depth- No • river flow(Small Gully) direction- flow from North to south
633+200	Kundra River	Depth to Soil/bed rock at foundation and abutment: • sediment cover –BMS (Sand and Gravel) • rock at depth- No • river flow direction- flow from north to south • Meandering river
636+218	Ghorai River	Depth to Soil/bed rock at foundation and abutment: • Sediment cover –BMS(Sand and Gravel) • rock at depth- No • Small Gully
639+310	Dry Nala	Depth to Soil/bed rock at foundation and abutment: • sediment cover –BMS(Sand and Gravel) • rock at depth- No • Small Gully

Source: Feasibility Report of BG 2020

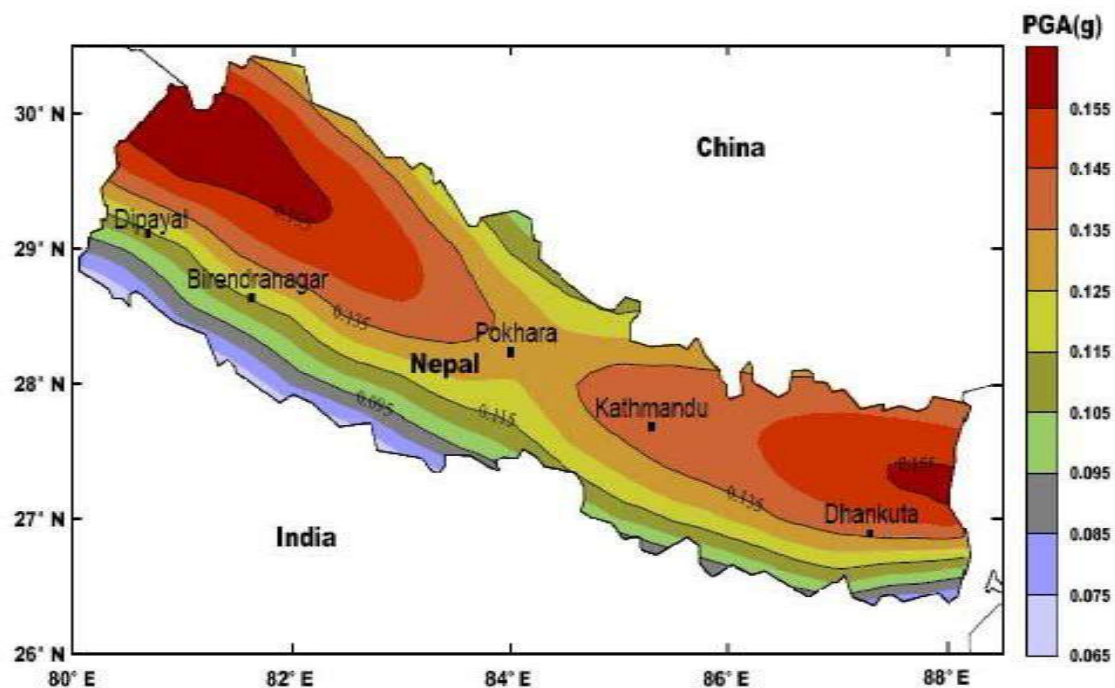
Seismicity

Nepal is located in one of the most active seismic zones of the earth. This is because Nepal lies in the collision zone between the Indian plate and the Eurasian plate. The Indian plate is continuously moving at a rate of approximately 20mm per year and pushing the Eurasian plate resulting in devastating

earthquakes in this region time and again. In the last century alone Nepal experienced some catastrophic damages due to the earthquakes of 1934, 1980, 1988, and 2015.

Seismic records have revealed that western Nepal has not experienced as many earthquakes as it is expected to have been and is in a state of seismic gap. This situation is interpreted as this area is waiting for a big earthquake anytime in the future. For the construction of big infrastructures specific standards had not been developed in Nepal to counter the seismic tremor. However, the national building code published by the Government of Nepal can be used as general guidelines. On the basis of the building code and some other literatures Seismic coefficient of the project area is considered to be as 0.095 to 0.115g.

According to Bajracharya (1994), the Nepal Himalaya has been subdivided into five seismic zones (Zone 1, Zone 2, Zone 3, Zone 4, Zone 5) with relation to the seismic hazard (Low, Moderate and High). The road alignment falls in the seismic low to moderate hazard area (Seismic zone 3 to 4). The Peak Gravitational Acceleration (PGA) value in the project area range from 0.095 to 0.115g (Figure 4-8).



Acceleration Map of Nepal

Landslide and Slope Stability

Slope stability depends on the existing geological structures, lithology of the rock units, soil type, topography, and hydrological condition (active seepage and spring). Failures have occurred in the in the colluvial deposits after the Tinau river specifically along the 1 km stretch of the project road. Furthermore, embankment erosion has been occurred due to flood in the project area. The Badganga basin frequently

suffers from flash floods as the catchment response to high intensity and short duration precipitation is swift, leading to flooding and water-logging downstream. In addition, there have been numerous instances where heavy rainfall in the downstream areas has led to water logging. Landslide, gully erosion and old slide scarp can be seen from Ch 590+000 to 591+000. Mainly Ch 590+550-990+600-590+700, 590+800, 591+000 is found active landslides, and gully erosion. The location of landslide was indicated in landslide hazard map (**Figure 4.9**).

At some bridge sites, embankment erosion was noticed due to high embankment. There is also observed riverbank cutting at Ch 610+100, 611+000, 621+420, 640+200.

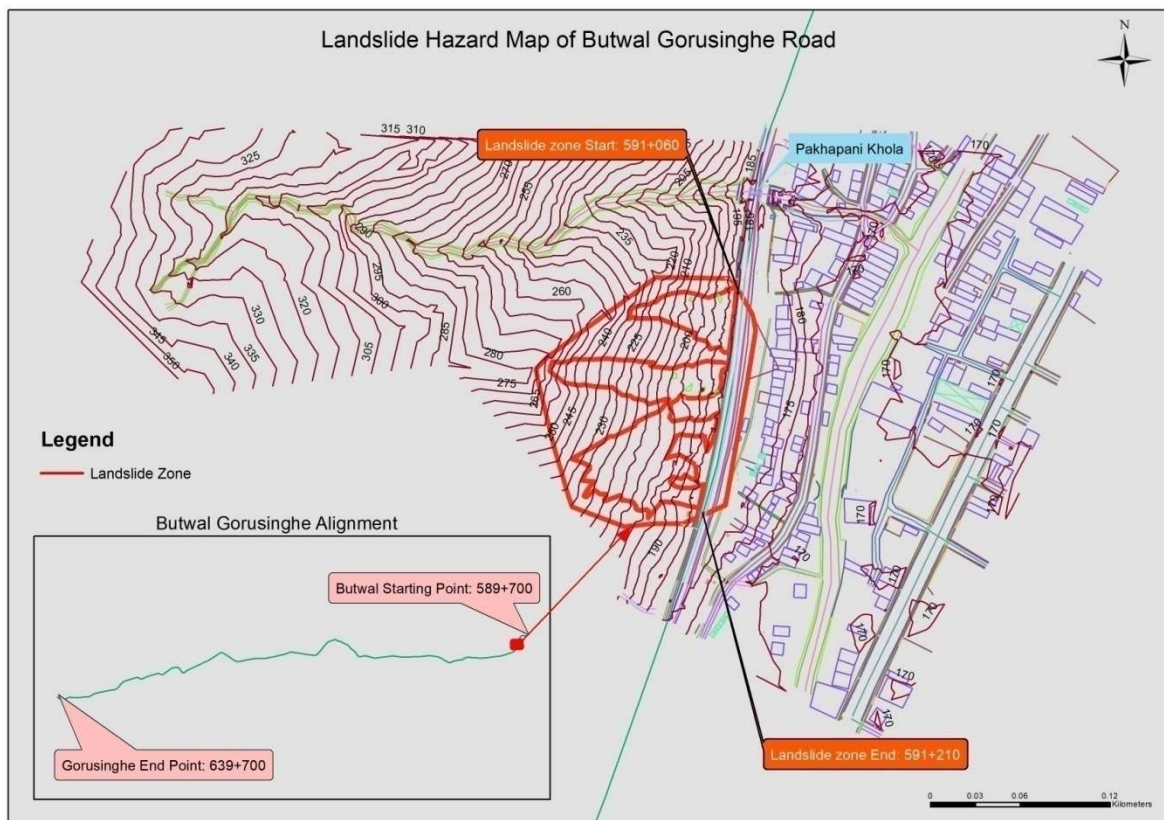


Figure 4.9: Landslide and instable slopes along BG road Section

4.2.5 Construction Material

Road construction requires various types of materials including naturally occurring construction materials. The availability and suitability of such naturally occurring materials nearby the project site plays a vital role in the cost component of the project. Naturally occurring construction materials such as embankment material, pavement materials like base/sub-base and surfacing materials as well as the material required for cross drainage and retaining structure will be needed in one or other form. In total about 61,160.00 Cum Sand, 284,400.00 Cum Aggregate, 68,320.00 Cum Stone, 402,500.00 Cum Subbase, 259,500.00 Cum Base materials is required for the project. During the field survey of the road alignment, the potential sources of these materials were identified in and around the alignment area. In the mean time survey of

the construction material is conducting by technical team in the vicinity of the project area. Probable source of construction materials as identified is presented in **Table 4-8**. These sites are located within the Corridor of Impact.

Table 4-8: Identified Sources of Locally Available Materials

S.N	Probable Quarries	Materials Available
1	Banganga River	Stone, Sand and aggregates, Chips for Asphalt Concrete
2	Tinau River	Sand and aggregates, Chips for Asphalt Concrete
3	Dano River	Sand and aggregates
4	Kanchan River	Sand and aggregates

4.3 Chemical Environment

4.3.1 Air Quality

The main sources of air pollution in the project area were windblown dust either from agricultural land or from the highway, moving vehicles, fuelwood for cooking.

The air quality monitoring was carried out in 9 locations. The nine locations along the alignment were selected in order to represent the typical conditions such as highly crowded areas and sensitive receptors (Hospital, School, etc.), settlements, forest areas and rural areas.

The air quality parameters that were measured during the monitoring were: Total Suspended Particles (TSP), Respirable Particulate Matter (PM10), and Respirable Fine Particles (PM2.5) for ambient air quality.

Table 4-9: Detail Information about Stations

Air and Noise Quality Measurement Station	Location	Coordinate	Remarks
STA01	Butwal (Starting Point)	27°42'15.31"N, 83°27'27.32"E	Sensitive Area and Settlement
STA02	Ramdevi collage	83°24' 02.33"E, 83°24' 02.33"E	Sensitive Area
STA03	Murgiya Chowk	27°41'15.57"N, 83°20'24.35"E	Settlement
STA04	Saljhandi	27°42'08.65"N, 8°15'53.77"E	Sensitive Area and Settlement
STA05	Pipra (Forest Area)	27°41'37.40"N, 83°13'35.55"E	Forest Area
STA06	Jitpur	27°41'12.55"N, 83°10'44.25"E	Settlement
STA07	Forest Area	27° 40'37.69"N, 83° 06'7.80"E	Forest Area
STA08	Gorusinghe Bazar	27°39'42.36"N, 83°02'20.77"E	Commercial Area

STA09	Dry Nala (End Point)	27°39'21.25"N, 82°59'56.50"E	End Point
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Field survey, December, 2021

In the study, three air pollutants have been measured namely PM₁₀, PM_{2.5} and TSP.

Figure 4-10 shows the average 24-h average concentration recorded in the nine measuring stations in the study area by using Low-Cost Portable Sampler. The measurement result shows that the PM_{2.5} exceeds the NAAQS limits (40 µg/m³) and WHO Air Quality Guideline, 2005 in the monitoring stations except second forest area (STA07). However, the particulate matter concentrations were recorded unusual in all the monitoring stations due to the high number of vehicular movements and open burning activities nearby the measuring stations. Thus, the higher concentration of PM_{2.5}, PM₁₀ and TSP was recorded in STA04 (Saljhandi) 167.82 µg/m³, 244.73 µg/m³ and 312.55 µg/m³ and followed by STA06 (Jitpur) due to degraded road condition, higher vehicular movement and burning activities nearby the monitoring sites. The minimum was recorded in Station 07 (Forest Area).

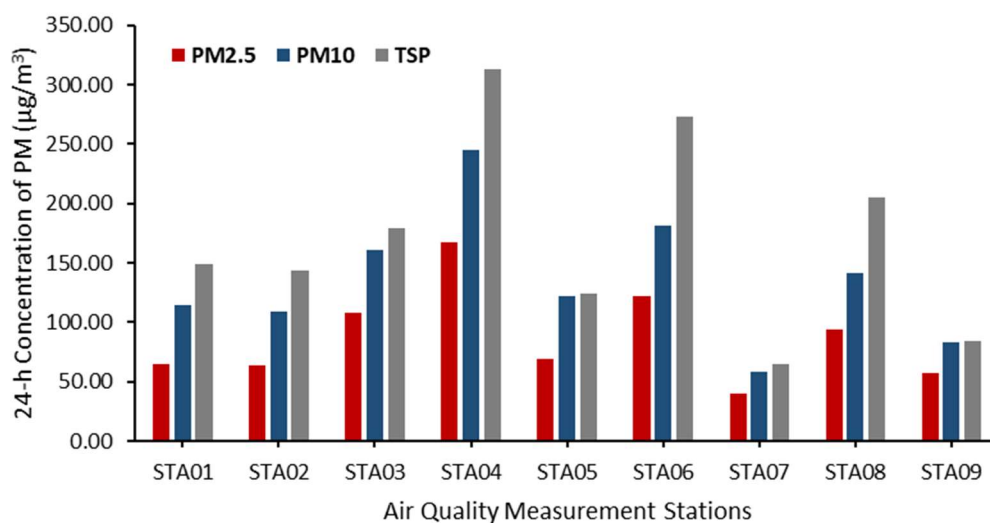


Figure 4.10: 24-h average concentration of particulate matter (PM_{2.5}, PM₁₀ and TSP)

Table 4-10: Air Quality Standard of Nepal, 2012 and WHO Ambient Air Quality Guidelines, 2005

Location	PM10	*PM2.5	TSP	*Lead	SO2	NOX	*Benzene	CO(%)
		(ug/Nm ³)						
NAAQS	<120	<40	<230	<0.5	<70.0	<80	<5.0	<1.0
WHO Standard	50	25	<150		20	40		

4.3.2 Noise Level

The main sources of noise pollution in the project area are traffic and other commercial activities in the road alignment. The noise level in the Project area has been measured at 9 stations. The noise levels were measured at the same location where air quality has been measured. The noise levels were calculated on the day time and night time. The average 24 hours noise level varies from 30.1dB(A) to 129.1 dB(A). The

maximum noise level is in Station 01(Butwal) and a minimum is in Station 07(Forest Area) during daytime. It is found that the recorded noise level is marginally higher (STN01) than the permissible limits (70 dB(A)) for 24-h outdoors (high traffic areas, commercial, shopping areas) prescribed by WHO. Moreover, the recorded noise is higher than the permissible limit for residential area prescribed by World Bank EHS standards of 55 dB(A) and 45 dB(A) for day time and night time respectively. The project road passes close to several residential areas, cities, and noise-sensitive receptors (hospital, school, etc.) along the highway. The results of noise (day time and night time) during the measurement period are shown in following Table 4-11.

Table 4-11: Noise Levels along the Road

S. N	Code of Station	Noise Level dB(A)					
		Day Time			Night Time		
		Min	Average	Max	Min	Average	Max
1	STN01	49.30	70.85	129.10	39.50	69.24	98.50
2	STN02	41.00	57.84	102.20	32.80	50.59	99.90
3	STN03	47.50	65.65	102.80	30.30	50.65	98.10
4	STN04	41.00	65.20	123.50	29.90	50.93	107.00
5	STN05	42.90	67.36	114.70	-	-	-
6	STN06	32.00	58.20	103.30	44.90	66.51	99.50
7	STN07	30.10	58.37	123.90	-	-	-
8	STN08	44.00	65.41	110.10	36.80	54.56	102.20
9	STN09	33.00	60.90	127.40	32.60	54.81	103.80

Note: Considering Day time from (7 am to 8 pm) and Night time (from 9 pm to 6 am).

Table 4-12: National Ambient Sound Quality Standard, 2012 and (WHO), 1999

S.N.	Description	NASQS limit (dBA)		WHO limit (dBA)	
		Day	Night	Night	Night
1.	Commercial	75	70	70	70
2.	Residential	65	55	55	45

4.3.3 Water Quality

Growing urbanization and developing industrialization are potential source of water pollution in the project area. Further mining in the river is another source of river water pollution.

Drinking water quality parameters were measured at 3 locations. Mainly 12 parameter were measured namely pH, Electrical Conductivity, Turbidity , Total Hardness , Total Alkalinity, Chloride, Ammonia, Nitrate, Calcium, Magnesium, Iron and Coliform. All the parameters are within the permissible standard value of NDWQS, Nepal except Iron level of Badara, Buddhabhumi-2. The sample of drinking water source of Badara, Buddhabhumi-2 is tube well, and at other two locations the drinking water source is water supply pipe. The details on locations, parameters and value are given in **Table.4-13**.

Table 4-13: Drinking Water Quality along the Road

S. N.	Parameters	Location and Values			NDWQS, Nepal	WHO Standard
		Tamnagar, Butwal-12	Bansgadhi Sainamaina -8	Badara, Buddhabhumi-2		
1.	pH at 17°C	7.7	7.9	7.6	6.5 - 8.5	
2.	Electrical Conductivity, (μ S/cm)	550	605	550	1500	
3.	Turbidity, (NTU)	<1	<1	3	5	
4.	Total Hardness as CaCO ₃ , (mg/L)	294	352	282	500	
5.	Total Alkalinity as CaCO ₃ , (mg/L)	283	363	297	-	
6.	Chloride, (mg/L)	3.96	<0.5	1.98	250	
7.	Ammonia, (mg/L)	N. D. (<0.05)	N. D. (<0.05)	<0.05	1.5	
8.	Nitrate, (mg/L)	7.08	0.81	0.44	50	
9.	Calcium, (mg/L)	84.97	91.38	90.58	200	
10	Magnesium, (mg/L)	19.93	30.14	13.61	-	
11	Iron, (mg/L)	N. D. (<0.05)	0.07	1.14	0.3	
12	<i>E. coli</i> Count, (MPN Index /100mL)	Nil	Nil	Nil	Nil	

From 10 major rivers, water samples were taken and water quality was analyzed to understand the water quality of the water bodies along the road. The parameters and results are given in Table -4-14. There are 8 water quality guidelines in Nepal, covering various aspects and goals of water standards for different categories of water use. They are consistent with WB IFC guidelines. All these guidelines must be followed during the time of construction as per requirements.

Table 4-14: Water quality of river along the road

Parameters	Name of River									
	Banganga	Kaila	Kanchan	Tinau	Tulbuliya	Ghamaha	Pahila	Banarahawa	Kothi	Bamaha
pH @ 15°C	8.4	8.1	8	8.5	8.2	8.3	8.1	8.1	7.7	8.2
Conductivity, (μ S/cm)	346	483	414	321	449	458	410	601	700	480

Turbidity, (NTU)	1	2	1	2	2	1	<1	3	1	1
TDS, (mg/L)	231	320	276	213	298	304	273	400	465	320
TSS, (mg/L)	<1	3	7	3	2	2	2	5	<1	1
Total Hardness, (mg/L)	231	320	276	213	210	232	220	322	462	248
Ca, (mg/L)	44.09	80.96	71.34	40.08	57.71	66.53	68.94	90.58	128.25	75.35
Mg, (mg/L)	12.15	20.42	13.61	17.5	16.04	16.04	11.67	23.33	34.51	14.58
Total Alkalinity as CaCO₃, (mg/L)	160	286	234	172	236	236	217	326	444	253
Nitrate, (mg/L)	0.96	0.44	1.25	1.11	0.81	1.7	0.74	0.07	0.07	0.81
Sulphate, (mg/L)	<1	2.47	2.47	9.06	<1	<1	<1	<1	2.47	<1
Chloride, (mg/L)	<0.5	0.5	1	0.5	3.47	5.94	<0.5	3.96	<0.5	2.48
BOD, (mg/L)	<1	2	2	3	<1	<1	<1	2	<1	1
COD, (mg/L)	1	7	9	10	2	3	2	9	3	6
Total Phosphorous as PO₄-P, (mg/L)	N. D. (<0.01)	N. D. (<0.01)	N. D. (<0.01)	N. D. (<0.01)	0.08	0.04	0.08	0.08	0.04	N. D. (<0.05)
Fe, (mg/L)	N. D. (<0.05)	0.13	N. D. (<0.05)	N. D. (<0.05)	0.13	0.08	<0.05	0.63	<0.05	0.34
Mn, (mg/L)	<0.02	0.03	<0.02	<0.02	0.02	0.03	0.02	0.23	0.04	0.07
Pb, (mg/L)	0.01	0.02	0.01	<0.01	0.01	0.01	0.02	0.02	0.03	0.02
Cu, (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn, (mg/L)	N. D. (<0.01)	<0.01	N. D. (<0.01)	<0.01	<0.01	<0.01	<0.01	<0.01	N. D. (<0.01)	0.02

4.3.4 Sanitation Infrastructure

Roadside markets, small shops, grocery, restaurants, and teashops are the major source of waste, which are seen along the roadside. The major percentage of waste generated from the roadside market and hotels are organic wastes such as waste food materials, fruits and vegetables, wood pieces, etc. whereas remaining percentage of waste are plastics, pet bottles, beer/whisky glass bottles, tin cans, broken pieces of glasses, rubber, iron pieces etc. Current practice of waste management observed in the project area is the degradable waste are managed by local technology, i.e. they make compost manure. Non-biodegradable wastes are collected by municipality and disposed in dedicated locations, there is also seen direct thrown along the roadside, highway or directly disposed into river. All municipalities and rural municipalities allocate budget for collection and the management of solid waste. However, the management of waste exists along the existing highway as well.

Current practice of sanitation, almost all people have pit latrine and wastewater discharge in the urban area like Butwal is direct connection to the sewerage line, in the rural area direct discharge in the own farmland or drainage line.

4.4 Biological Environment

4.4.1 General ecosystem and biodiversity

Nepal is a mountainous country with mountain ridges and deep valleys, supporting a wide range of floral and faunal habitats. Nepalese wetlands have high ecological value, as they provide habitat for many threatened and endemic species of flora and fauna, and serve as resting places for many migratory and globally threatened birds. Fishes, amphibians and reptiles are no exception. These diversities face severe threat to a level of extinction due to anthropogenic development, associated with soil and water pollution, deforestation, habitat loss, unsustainable extraction, etc. Nepal has accelerating activities such as construction of dams for hydropower and irrigation, road and other linear infrastructure development, in addition to recent population growth, climate change, land use changes have direct impact on the ecology of these Himalayan mountains and snow caps. Among many of the human activities, building roads is a significant activity in process in Nepal. Roads travel through the Forests and Farmland, grassland and wetlands, etc. Major impacts of road construction/upgradation on ecosystems include loss, degradation, and fragmentation of ecosystems due to construction, road kills, injuries and casualties of wildlife (e.g. recent deaths of tigers in Paras NP and Bardiya NP – road kills), wildlife – vehicle collisions, among others.

The Butwal - Goringhale Section largely traverses through residential areas, farms, forests and rivers crossings. Regarding forests, while there is a small block of forest in Butwal area, but the major two forest areas lie in the later part along the west of the alignment, Saljhandi-Pipara Forest block (KM 611+870 to KM617+730 – 5.86 km long section) and Goringhale Forest block (KM 626+970 to KM635+200 – 8.23 km long). Saljhandi – Pipra forest block is a good Sal (*Shorea robusta*) forest and, Goringhale forest blocks is mixed deciduous forest with patchy good Sal forest blocks. Goringhale forest block is already degraded compared to Saljhandi-Pipra block of forests along the highway. Major length of road alignment are settlements and farmland that has been under human influence thereby little wildlife motilities in the area. Wildlife mobility is noted in Saljhandi-Pipra forest block and Goringhale forest block. Saljhandi-Pipra and Goringhale forest block extend southward from Churia/Siwalik forest with movement of wildlife south-north and vice versa. Badhare/Budhi Forest block (KM 637+720 to KM 639+000 – 1.28 km long) is another forest but degraded, scanty, dry and confined in a small area. Saljhandi-Pipara and Goringhale forest block extends to north connecting Churia range from where wildlife migrates down south, road side and/or some crossing the road to visit forest blocks south of the road (figure 1). The highway runs through most of the seasonal rivers except the Tinau River and Banganga River, which had a very limited flow during the dry season, times of field study. Most of the other rivers were dry. Majority of springs/streams/ rivers remain dry most of the time in year besides Tinau River, Baanganga River, Kanchan Khola, Kothi Khola, Kandra Khola, Kaila Khola and Harkur Khola with perennial flow with low flow at the dry season. Prime habitat for the fish species is in Tinau River and Baanganga River (Table 5). Riverine ecosystem in the project site is influenced by human activities; Fishing, extraction of river deposits, laundering and bathing, direct sewage disposal, discarded trash deposits, riverbank encroachment and recreational gathering at riverbank (picnic).

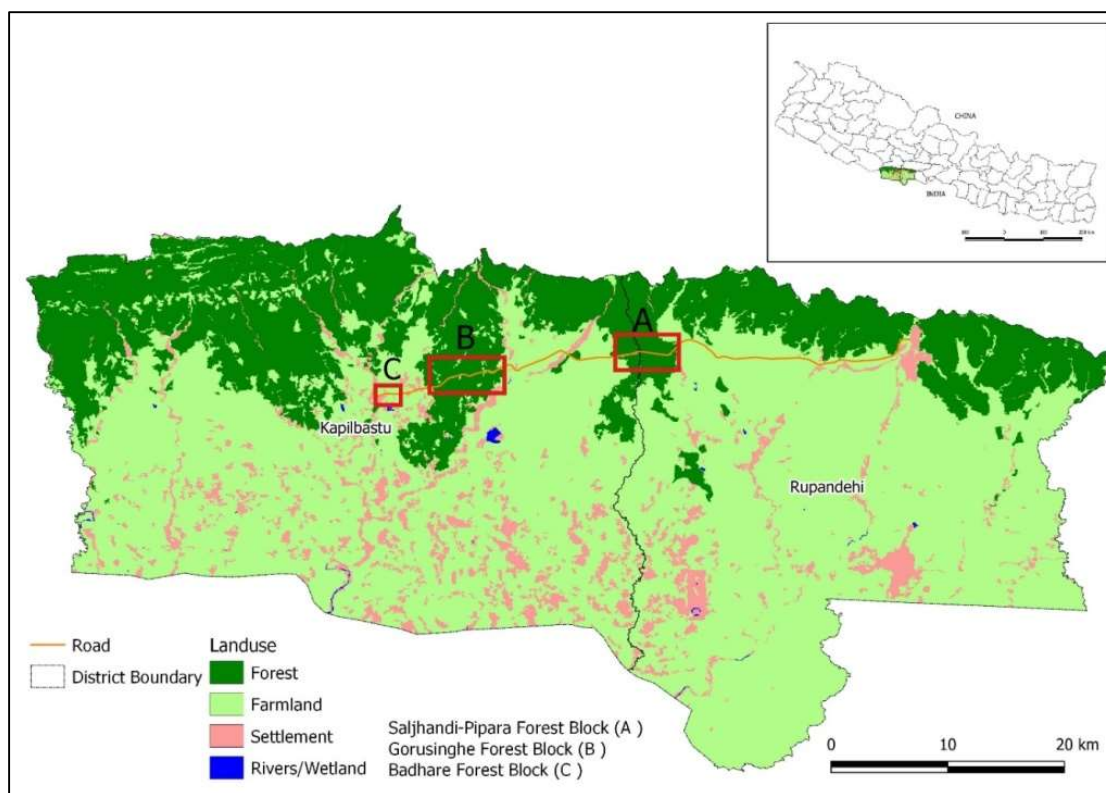


Figure 4.11: Land use map of BG Road

There are 118 identified ecosystems in Nepal, including 112 forest ecosystems, 4 cultivation ecosystems, 1 water body ecosystem, and 1 glacier or rock ecosystem. These ecosystems range from the tall grasslands, marshlands, and tropical and subtropical broadleaf forests along the Terai and Siwalik Hills to the subtropical and tropical broadleaf and conifer forests in the Middle Mountains.

4.4.2 Flora

Different vegetation composition was found on both sides of the road. The road alignment of the project falls in tropical zone with the forest dominated by *Shorea robusta* (*Sal*) forest and patches of *Dalbergia-Acacia* forest along the riverine sections. *Terminalai sps*, *Lagerstroemia parviflora*, *Phyllanthus emblica*, *Pterocarpus marsupium* has the major associated species of *Shorea robusta* forest. In the *Dalbergia-Acacia* forest, *Dalbergia sissoo*, *Acacia catechu* and *Bombax ceiba* has the major species. Both native and introduced plant species are found along the road. Native species were mainly found in natural forests where as local people have planted exotic species in their home-yard for different purposes.

Different patches of vegetation composition were found on both sides of the road. The major blocks of forest area distributed from 611+870 to 617+730(5860m) in Rupandehi district. Another major block of forest is from 626+970 to 635+200(8130m) and 637+720 to 639+000 (1280m) in Kapilbastu district. The forest is managed by the Government, community and collaboration forest. Approximately 28.46 ha forest land will be change in to the road. Compare with the district forest area coverage, forest land loss in the RoW is about 0.024%.

Tree Census Survey

A Tree Census Survey (TSE) has been done to count the tree species along the ROW of the road. TSE identified all the tree species and documented along the RoW. All the tree species were categorically measured at breast height for diameter, height and taken GPS coordinate. Trees were classified on sapling, pole and trees based on diameter breast height (dbh). Tree species with dbh less than 10 cm is categorized as sapling, from 10 to 30 cm as pole and above 30 cm as tree. The distribution of trees along the alignment, both side of the road were counted and recorded in the data sheets.

4.4.3 Forest Types

Forest type by ownership was studied along the road just outside of RoW.. Government managed forest, Community forest³, and Collaborative forest⁴ were the three management types found along the RoW with dominance of Community forest (>80%). The project site runs through Tilaurakot collaborative forest, a good exemplary collaborative forest in Nepal. Altogether, the road crosses ten community forests and two collaborative forests and government forest. Details name of these forest management nearby road are presented in **Table 4-15**.

Table 4-15: Forest Types Based on Ownership

SN	Name	Forest Type	District
1	Pragati	Community Forest	Kapilvastu
2	Saljhandi	Community Forest	Rupandehi
3	Butwal	Community Forest	Rupandehi
4	Mayadevi	Collaborative Forest	Rupandehi
5	Jiteshowr	Community Forest	Rupandehi
6	Piparakot Mahila	Community Forest	Kapilvastu
7	Tilaurakot Collaborative Forest	Collaborative Forest	Kapilvastu
8	Shiva Mandir	Community Forest	Kapilvastu
9	Majhaua	Community Forest	Kapilvastu
10	NabaJagriti	Community Forest	Kapilvastu and Rupandehi
11	Shanti	Community Forest	Rupandehi
12	Mayadevi	Community Forest	Rupandehi
13	National Forest	Government Forest	Kapilvastu and Rupandehi

More than 80 tree species were recorded during the survey and the list of these species is given in **Table 4-16**.

Table 4-16: Tree species found in the project area

Name of Species	Remarks
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³ Community forest is a participatory forest management system, the control, protection and management of forest resources by local communities.

⁴ Collaborative forest management (CFM) is a 'community-based' forest tenure regime that works in partnership between the central government, local government and local forest user groups

Local Name	Botanical Name	
Amala	<i>Phyllanthus emblica</i>	
Amara	<i>Unknown</i>	
Amilo	<i>Citrus maxima</i>	
Amrit	<i>Unknown</i>	
Ashoka	<i>Saraca asoca</i>	
Asna	<i>Terminalia tomentosa</i>	
Badahar	<i>Artocarpus lakoocha</i>	
Bajhi	<i>Anogeisus latifolius</i>	
Bakaino	<i>Melia azadirach</i>	
Bakal lady	<i>Unknown</i>	
Bamboo bush	<i>Dendrocalamus sps</i>	
Bar	<i>Ficus benghalensis</i>	
Barro	<i>Terminalia belerica</i>	
Batokorukh	<i>Unknown</i>	
Bayer	<i>Ziziphus zuzuba</i>	
Bedulo	<i>Ficus sarmentosa</i>	
Bel	<i>Aegle marmelos</i>	
Belauti	<i>Psidium guajava</i>	
Bhalayo	<i>Semecarpus anacardium</i>	
Bijaysal	<i>Pterocarpus marsupium</i>	Protected species as per Government of Nepal, and as per IUCN near threatened
Bodari	<i>Unknown</i>	
Botdhairo	<i>Lagerstroemia parviflora</i>	
Cchhinchini	<i>Unknown</i>	
Chiku	<i>Unknown</i>	
Chiple	<i>Unknown</i>	
Chulbule	<i>Unknown</i>	
Curry leaf	<i>Messua ferrea</i>	
Dabdabe	<i>Garuga pinnata</i>	
Degar	<i>Unknown</i>	
Dhamina	<i>Unknown</i>	
Dhupi	<i>Cupressus sps</i>	
Dumri	<i>Ficus racemosa</i>	
Emli	<i>Tamarix diocia</i>	
Gayo	<i>Bridelia retusa</i>	
Ghanteful	<i>Unknown</i>	
Gulmohor	<i>Delonix regia</i>	
Hade	<i>Leucaecoroman delica</i>	
Haldu	<i>Adina cordifolia</i>	
Harro	<i>Terminalia chebula</i>	

Ipilipil	<i>Leucaena leucocephala</i>	
Jamun	<i>Syzizium cumini</i>	
Jhilmili	<i>Unknown</i>	
Jhyot	<i>Unknown</i>	
Kadam	<i>Anthocephalus chinensis</i>	
Kagati	<i>Citrus aurantifolia</i>	
Kapur	<i>Cinnamomum camphora</i>	
Katahar	<i>Artocarpus heterophyllus</i>	
Khair	<i>Acacia catechu</i>	
Khaltu	<i>Unknown</i>	
Khaniyo	<i>Ficus cunia</i>	
Khirro	<i>Sapium insigne</i>	
Kimbu	<i>Morus alba</i>	
Kjai	<i>Unknown</i>	
Kumbi	<i>Careya arborea</i>	
Kusum	<i>Schleiche raoleosa</i>	
Kutmero	<i>Litseamono petala</i>	
Lichi	<i>Litchi sps</i>	
Mango	<i>Mangifera indica</i>	
Masala	<i>Eucalyptus sps</i>	
Mauwa	<i>Englehardia spicata</i>	
Neem	<i>Azadirachta indica</i>	
Nyaro	<i>Ficus semecordata</i>	
Pipal	<i>Ficus religiosa</i>	
Pyalophul	<i>Unknown</i>	
Pyari	<i>Unknown</i>	
Rajbrikshya	<i>Cassia fistula</i>	
Rohini	<i>Mallotus philippensis</i>	
Sal	<i>Shorea robusta</i>	Protected species as per Government of Nepal and as per IUCN least concern
Sami	<i>Ficus benjamina</i>	
Satisal	<i>Dalbergia latifolia</i>	
Shrikhanda	<i>Santalum album</i>	
Sifalikan	<i>Unknown</i>	
Simal	<i>Bombax ceiba</i>	
Simalchini	<i>Unknown</i>	
Sisso	<i>Dalbergia sissoo</i>	
Sitafal	<i>Annona tictulata</i>	
Sitalchini	<i>Unknown</i>	
Suntala	<i>Citrus sps</i>	
Supari	<i>Areca catechu</i>	

Taki	<i>Bauhinia purpurea</i>	
Tatari	<i>Dillenia pentagyna</i>	
Teak	<i>Tectona grandis</i>	
Teju	<i>Unknown</i>	
Tikulikaram	<i>Unknown</i>	
Tilka	<i>Unknown</i>	
Tite	<i>Unknown</i>	
Tote	<i>Ficus hispida</i>	
Vilor	<i>Trewia nudiflora</i>	

Source: Field Survey 2021

4.4.4 Protected Flora Species

Shorea robusta (Sal) and *Pterocarpus marsupium* (Indian kino) is a protected species as per Government of Nepal, banned for felling, transportation and export and *Shorea robusta* is least concern and *Pterocarpus marsupium* is near threatened species as per IUCN .

4.4.5 Fauna

Detailed methodology for collecting the fauna is given in Annex 1. The list of key species re also given in Annex 1.

4.4.5.1 Mammal

Butwal-Gorusinghe road section passes through three isolated forest patches i.e. Saljhandi-Pipara Forest block (611+800-617+900), Gorusinghe Forest block (627+000-635+600) and Badhare Forest block (637+700-640+000). Badhare forest is completely degraded while Saljhandi-Pipara forest block and Gorusinghe forest block are fairly in good condition and extend northward connected with Churia range from where mammal species can be observed.

The indirect sign study and road kill survey recorded 12 mammals and additional 12 species listed in various studies totalling 24 mammal species recorded in the study area (Table 4.17). The recorded mammal species include Barking Deer (*Muntiacus vaginalis*), Fishing cat (*Prionailurus viverrinus*), Leopard (*Panthera pardus*), Large Indian Civet (*Viverra zibetha*), Golden Jackal (*Canis aureus*), Jungle Cat (*Felis chaus*), Rhesus Macaque (*Macaca mulata*), Small Asian Mongoose (*Herpestes javanicus*), Wild Boar (*Sus scrofa*).

Fishing cat present in the project area is globally threatened, while nine species included of Indian Spotted Deer (*Axis axis*), Nilgai (*Boselaphus tragocamelus*), Barking Deer, (*Muntiacus vaginalis*) Striped hyaena (*Hyaena hyaena*), Honey badger (*Mellivora capensis*), Fishing Cat (*Prionailurus viverrinus*), Crab-eating mongoose (*Herpestes urva*), Common Leopard (*Panthera pardus*), Bengal Fox (*Vulpes bengalensis*) are Nationally threatened species. Striped Hyaena present in the project area is nationally protected mammal. Detailed information on Indian crested porcupine (*Hystrix indica*) is nationally Data Deficient species.

Table 4-17: Mammal species in the Project Area

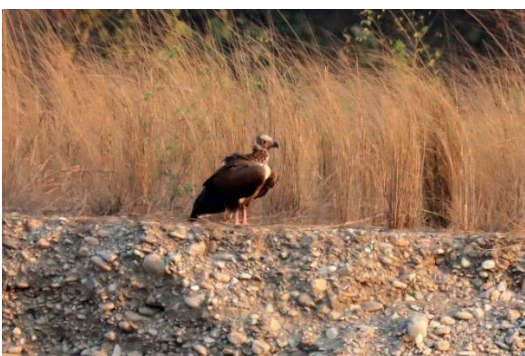
S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		

1	Indian Spotted Deer	<i>Axis axis</i>	LC	VU		Suwal and Verheugt,1995; Ernst 2003
2	Nilgai	<i>Boslapthus tragocamelus</i>	LC	VU		Suwal and Verheugt,1995; Corbet and Hill, 1992
3	Barking Deer	<i>Muntiacus vaginalis</i>	LC	VU		Pellet observed; sound heard
4	Sambar	<i>Rusa unicolor</i>				Pellet observed
5	Wild Boar	<i>Sus Scrofa</i>	LC	LC		Observed boar ploughing sign; Sign survey
6	Striped Hyaena	<i>Hyaena hyaena</i>	NT	EN; Protected		Scat observed
7	Honey Badger	<i>Mellivora capensis</i>	LC	VU	III	Prater, 1971; Suwal and Verheugt, 1995; Vanderhaar and Hwang, 2003; Baral and Shah, 2008
8	Fishing Cat	<i>Prionailurus viverrinus</i>	EN	EN	II	Photo evidence
9	Crab Eating Mongoose	<i>Herpestes urva</i>	LC	VU		Suwal and Verheugt, 1995
10	Leopard	<i>Panthera pardus</i>	NT	VU	I	Scat and pugmark observed
11	Bengal Fox	<i>Vulpes bengalensis</i>	LC	VU		Pocock, 1936; Mitchell, 1977; Johnson et al, 1980; Ernst 2003; Gompper and Vanak, 2006; Baral and Shah, 2008; Home and Jhala, 2009;
12	Large Indian Civet	<i>Viverra zibetha</i>	NT	NT		Road killed; Photo evidence
13	Golden Jackal	<i>Canis aureus</i>	LC	LC		Observed; Road killed
14	Jungle Cat	<i>Felis Chaus</i>	LC	LC	II	Observed; Road killed
15	Indian Grey Mongoose	<i>Herpestes edwardsii</i>	LC	LC		Inskip 1988; Corbet and Hill, 1992; Suwal and Verheugt, 1995; Santiapilla et al, 2000; Ernst, 2003; Sheikh, 2005; Baral and Shah, 2008
16	Small Asian Mongoose	<i>Herpestes javanicus</i>	LC	LC		Footprints observed
17	Yellow-throated Marten	<i>Martes Flavigula</i>	LC	LC		Suwal and Verheugt, 1995; Ernst, 2003; Baral and Shah, 2008; Ghimire, 2010
18	Masked Palm Civet	<i>Paguma larvata</i>	LC	LC		Suwal and Verheugt, 1995; Baral and Shah, 2008
19	Small Indian Civet	<i>Viverricula indica</i>	LC	LC		Baral and Shah, 2008
20	Rhesus Macaque	<i>Macaca mulata</i>	LC	LC		Observed; Photo Evidence
21	Terai Grey Langur	<i>Semnopithecus hector</i>	NT	LC	I	Baral and Shah, 2008
22	Five-striped Palm Squirrel	<i>Funambulus pennantii</i>	LC	LC		Suwal and Verheugt, 1995; Baral and Shah, 2008
23	Indian Hare	<i>Lepus nigricollis</i>	LC	LC		Pellets observed
24	Indian Crested Porcupine	<i>Hystrix indica</i>	LC	DD		Quills observed

Avifauna

The Butwal-Gorusinghe road alignment passes through farmland and tropical Sal forest that are richest in the bird species (Grimmett et al., 2016). The survey reported 93 species across the road alignment. The reported birds are 26 full migrants, 8 altitudinal migrants, 2 nomadic and the rest 55 are residents. Parakeet species such as Plum-headed Parakeet (*Himalayapsitta cyanocephala*), Alexandrine Parakeet (*Palaeornis eupataria*) and Slaty-headed Parakeet (*Himalayapsitta himalayana*) are the most frequently observed and abundant species across the study area. No nesting/roosting site in the forest area in RoW was found during field survey. The detailed list of species is listed in Annex 1.

Of the total recorded species, 3 species are globally Critically Endangered, 1 Endangered, 1 Vulnerable species, 2 Near Threatened and rest 87 species are categorized as the Least Concerned Species by IUCN Red list. Similarly, 2 species are nationally Critically Endangered, 1 Endangered and 3 Vulnerable and 4 Near Threatened. None of the species are Nationally protected. Seventeen species among the total reported avifauna are regulated by the Convention on International Trade in Endangered Species (CITES) of wild fauna and flora. It comprised of 16 species listed in CITES Appendix-II and 1 species in CITES Appendix-III.



Red-headed Vulture (*Sarcogyps calvus*)

Global Status: Critically Endangered

National Status: Endangered

CITES: Appendix-II

Habitat: Open country

Migratory status: Resident



Steppe Eagle (*Aquila nipalensis*)

Global Status: Endangered

National Status: Vulnerable

CITES: Appendix-II

Habitat: Open Country

Migratory Status: Migratory



Lesser Adjutant (*Leptoptilos javanicus*)

Global Status: Vulnerable

National Status: Vulnerable

Habitat: Wetland (Farmland)

Migratory Status: Resident



Himalayna Griffon (*Gyps himalayansis*)

Global Status: Near Threatened

National Status: Vulnerable

CITES: Appendix-II

Habitat: Open Country

Migratory Status: Resident



Slender-billed Vulture (*Gyps tenuirostris*)

Global Status: Crittically Endangered

National Status: Crittically Endangered

CITES: Appendix-II

Habitat: Open Country

Migratory status: Resident



White-rumped Vulture (*Gyps bengalensis*)

Global Status: Crittically Endangered

National Status: Crittically Endangered

CITES: Appendix-II

Habitat: Open Country

Migratory status: Resident

Figure 4.12: Conservation significant bird species observed in the project area

Herpetofauna

Butwal-Gorusinghe Road alignment has forest, farmland, springs and rivers that are habitat of Herpetofauna. Most of the herpetofauna such as frogs and toads, and lizards recorded from the study area were gathered through literature, and much lesser herpetofauna were observed during the field study. In total 47 herpetofauna diversity is recorded in the study area. These include 9 species of frogs and toads, 10 species of skinks, Geckos and lizards, 20 species of snakes and python and 8 species of turtle and tortoise (See Annex 1 for list). Crocodiles were neither listed in the report nor were found through field survey. However, mugur crocodile (*Crocodylus palustris*) was reported to have been observed in Kothi River pool during the consultation with division forest office and public. Likewise, most herpetofauna species listed may not necessarily be represented as the limited species were observed during the field survey. To understand the better picture of herpetofauna status in the study area, additional field survey in the different seasons (spring/summer) before construction work would be beneficial as the field survey was limited in winter season, i.e., dormant period when the species undergo hibernation under the ground.

Frogs and toad species reported were globally least concerned species while national status is yet to be assessed. Among listed amphibians, Indian Bull frog (*Hoplobatrachus tigerinus*) is regulated in Appendix-II in CITES. Majority of reptilian species; skinks, Geckos, lizards, snakes and python besides turtle and tortoise reported present in the project district are yet to be assessed for threatened category globally and nationally. Bengal Monitor (*Varanus Bengalensis*) and Golden monitor (*Varanus flavescens*) present in project district are regulated by CITES appendix-II. Golden monitor (*Varanus flavescens*) is protected by the National Park and Wildlife Conservation Act, 1973.

Among snake and python species, Burmese python (*Python molurus bivittatus*), and King cobra (*Ophiophagus hannah*) are globally vulnerable species and listed in CITES appendix-II. Common rat snake (*Ptyas mucosus*) and Monocellate cobra (*Naja kaouthia*) are also regulated by CITES appendix-II while Russell's Viper (*Daboia russelii*) is in CITES Appendix-III. Unlike other herpatofauna, most of turtle and tortoise present in the project site are globally threatened species and regulated by CITES Appendices I and II. Tricarinate hill turtle (*Melanochelys tricarinata*), Indian softshell turtle (*Aspideretes gangeticus*), and Indian eyed turtle (*Morenia petersi*) are globally endangered while Indian peacock softshell turtle (*Aspideretes hurum*) is globally vulnerable species and Elongated tortoise (*Indotestudo elongate*) is globally critically endangered species. All these cited species were not located during the field survey.

Fish

Butwal-Gorusinghe Road section passes through two rivers (i.e. Tinau River and Baanganga River), seasonal and perennial springs (18) and seasonal culverts (10) (Table 4.18 gives locations). The field study recorded seven fish species and the presence of additional seven fish species in the project site was reported through the publications; with total of 14 fish species in project site (See Table 3 in Annex 1 for detailed list of species). In addition, one Eel species reported present in Baanganga River based on public consultation.

All fish species recorded present in the water bodies of study are classified as Least Concerned. While Copper Mahseer (*Neolissocheilus hexagonalepis*) is nationally Vulnerable, others are common fish species.

One Eel species reported present in Baanganga River could relate to Eel species (*Macrogathus aral*, *Macrogathus punctatus* and *mastacembelus armatus*) reported in Jagadishpur Reservoir which is located 12 kilometers downstream from the Baanganga River. A total of 43 fish species, Including three Eel species, were reported in Jagadishpur Reservoir (IUCN, 2015). Jagadishpur Reservoir is drained through canal from Baanganga River and the canal provides fish movement passage between the Baanganga River and the Jagadishpur Reservoir.

Table 4-18: Rivers/Streams/Culverts in the Butwal-Gorusinghe Road Section

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
1	Belbagdevi Khola	82.995702	27.658257	Perennial stream; very low flow at dry season; some fish species reported
2	Culvert	82.999625	27.655614	Seasonal water flow through the culvert
3	Kundra Khola	83.05824517	27.66751327	Perennial stream; Very low flow during dry season; some fish species reported
4	Culvert	83.060966	27.669932	Seasonal water flow through the culvert
5	Harkur Khola	83.077429	27.673144	Perennial stream; very low flow during dry season; some fish species reported

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
6	Baanganga Khola*	83.163549	27.692111	Perennial stream; low flow at dry season; Some fish species present
7	Kaila Khola	83.117485	27.680786	Perennial stream; low flow at dry season; Some fish species present
8	Bahulendra Khola	83.098216	27.67651	Perennial stream; low flow at dry season; Some fish species present
9	Culvert	83.029742	27.658772	Seasonal water flow through the culvert
10	Culvert	83.094004	27.676752	Seasonal water flow through the culvert
11	Culvert	83.181405	27.687346	Seasonal water flow through the culvert
12	Kothi Khola	83.228681	27.693763	Perennial stream; low flow at dry season; Some fish species present
13	Kanchan Khola	83.262446	27.700635	Perennial stream; low flow at dry season; Some fish species present
14	Culvert	83.264918	27.702587	Seasonal water flow through the culvert
15	Pahila Khola	83.266879	27.703158	Perennial stream; low flow at dry season; Some fish species recorded
16	Culvert	83.292274	27.69114	Seasonal water flow through the culvert
17	Banarhawa Khola	83.297025	27.688688	Seasonal stream; Very low flow during dry season; fish species probable during wet season
18	Ingmuriya Khola	83.302376	27.689236	Seasonal stream; Very low flow during dry season; fish species probable during wet season
19	Megahawa Khola	83.318942	27.688173	Seasonal stream; Very low flow during dry season; fish species probable during wet season
20	Marthiwa Khola	83.322062	27.688455	Seasonal stream; Very low flow during dry season; fish species probable during wet season
21	Tulbuliya Khola	83.33049	27.688575	Seasonal stream; Very low flow during dry season; fish species probable during wet season
22	Ghamaha Khola	83.333373	27.688268	Seasonal stream; Very low flow during dry season; fish species probable during wet season
23	Culvert	83.358482	27.68818	Seasonal water flows through the culvert
24	Culvert	83.370364	27.687513	Seasonal water flows through the culvert
25	Culvert	83.381261	27.682986	Seasonal water flows through the culvert
26	Bamaha Khola	83.385243	27.682495	Seasonal stream; Very low flow during dry season; fish species probable during wet season
27	Rajpur khola	83.38988435	27.68369904	Seasonal stream; Very low flow during dry season; fish species probable during wet season
28	Soila Khola	83.393188	27.684051	Seasonal stream; Very low flow during dry season; fish species probable during wet season

S.N	River/Stream/Culvert	Longitude	Latitude	Remarks
29	Satgadi Khola-2*	83.403841	27.686389	Seasonal stream; No water flows during dry season
30	Satgadi Khola-1*	83.406427	27.68613	Seasonal stream; No water flows during dry season
31	Tinau Khola (Branch)*	83.380249	27.678482	Perennial; Tinau branch flowing southwest; low flow during dry season; Some fish species of reported
32	Jitgadi Bridge	83.456868	27.70446	Seasonal stream; No flow at during dry season
33	Tinau Khola	83.46076132	27.70404285	Perennial and main Tinau river (Butwal); Fish species present
*Streams proposed as quarry site				

Forests as wildlife habitat

Saljhandi-Pipara forest block and Goringhe forest block are serving as wildlife corridor for mammal movement across north-south crossing the highway. These forest areas dense refuting wildlife. In Saljhandi-Pipara forest, however, wild mammals crossing the highway in Saljhandi-Pipar Forest are merely observed mainly because of the presence of barbwire fence along of the road (except for Rhesus macaque).

Unlike, forest edge at highway side in Goringhe forest block is without fence providing free movement of wild mammals crossing the highway. Moreover, the forest is comparatively dense. While roadkill records are not maintained in Sub-division Forest Offices, the three cases of road kill of small mammals; Jungle cat, Golden Jackal and Large Indian Civet were recorded in Goringhe forest block during the filed survey (Figure 4.13).



Figure 4.13: Road Killed Jungle cat (left), Golden Jackal (middle) and Large Indian Civet (right) at Goringhe forest

Rhesus macaque was noted in the Saljhandi-Pipara forest block of highway picking discarded food along the roadside. The macaque approaching roadside was observed at a place where bus stop for sanitary break of commuters. During the break, the commuters disposed of instant food packets and cereals, which attracted macaque to feed on them. No roadkill was observed, however there is higher chances of roadkill of these species.

According to the consultation with forest officials and community forest users, wildlife poaching and trapping at Argakhanchi district locating about 8 kilometers north of the highway have been resulting in the wildlife congregation near highway area since higher security and forest management activities provided by the forest officials and community forest users groups. The competition for the food source and foraging ground are also inducing the wildlife movement from the high mountain area in the north to Terai region in south, which could potentially increase the chances of collision with traffic and wildlife casualties.

4.4.6 Key Biodiversity Areas (KBAs) and Protected Areas

An ecological screening exercise is carried out to identify the key biodiversity areas and protected areas around the project sites using an Integrated Biodiversity Assessment Tool (IBAT) developed by the International Union of Conservation of Nature (IUCN) and its partners. The project areas are not located in any national or international protected areas. The closest protected area is Jagadishpur Reservoir designated as a Ramsar Site which is located 12km south of the project site. The second closest is Chitwan National Park which is 50km away from the project site.

The IBAT study identified Gaida Lake or Gaidahawa lake (see Figure 4.14) as a potential KBA site around the project area because of the presence of Indian Eyed Turtle (*Morenia petersi*), which is Vulnerable species. The study team undertook the field survey as well as desk review to assess baseline condition and potential risks and impacts as the result of the project.

Gaidahawa lake (Gaida Lake)

The location of the Gaidahawa lake is Lat: 27.64 Lon: 82.96 situated at Gaidahawa Village. The lake is approximately 12km away from the project site. The lake is spread over an area of 10,391 ha of land and was established in 2005. Gaidahawa Lake or Gaida lake is inland lake in Gaidhawa Rural Municipality, Rupandehi District (Figure below). It is reported as the biggest lake in the Rupandehi District. It is manmade lake with devoid of inlet and outlet. Water in the lake is filled by the accumulation monsoon water and aquifer from the forest in the proximity. The lake have been used for the fishery by the local (Photo below). Besides the lake serving for the fishery, it is providing habitat for wetland birds.

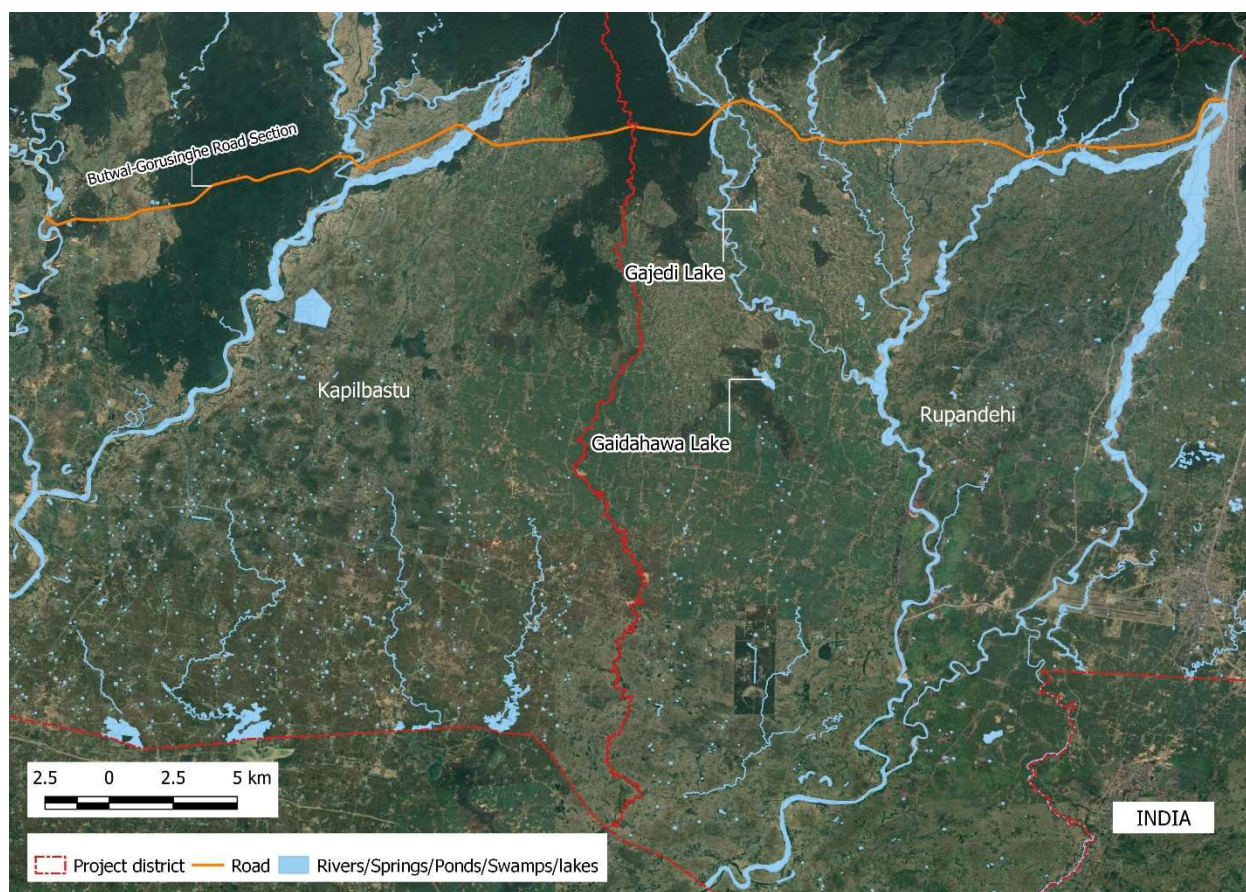


Figure 4.14: Gaidahawa lake/Gajedi lake locational map overlaid in google earth image

The field study reported 17 wetland birds (Table 4.19) and 3 raptors (Table 4.20) during the field study. The lake is a congregation area for the wetland birds. Wetland birds recorded in the lake during field survey are globally Least Concerned. Asian Openbill (*Anastomus oscitans*) recorded in lake is nationally vulnerable while River Lapwing (*Vanellus duvaucelii*), Ruddy Shelduck (*Tadorna ferruginea*) and Small Pratincole (*Glareola lactea*) are nationally Near Threatened bird species. Two species of vultures; Himalayan griffon (*Gyps himalayensis*) and Cinereous vulture (*Aegypius monachus*) were observed during field study.

The lake is serving as the congregation site as well as stop-over for the wetland birds. Gaidahawa Lake, while an important habitat for birds, is yet to be determined as a KBA site. The biodiversity feature triggering KBA is the presence of the Indian Eyd Turtle which is a reptile category, but the turtle was not recorded in the Gaida Lake during the field study.

Table 4-19: Wetland birds in Gaidahawa Lake/Gajedi lake observed during Field Study

S.N	Common Name	Scientific Name	Conservation Status		CITES	Movement Pattern
			Global	National		
1	Asian Openbill	<i>Anastomus oscitans</i>	LC	VU		Not a Migrant
2	Bar-headed Goose	<i>Anser indicus</i>	LC			Full Migrant
3	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	LC			Full Migrant

4	Cattle Egret	<i>Bubulcus ibis</i>	LC			Full Migrant
5	Common Sandpiper	<i>Actitacus hypoleucos</i>	LC			Full Migrant
6	Great Egret	<i>Ardea alba</i>	LC			Full Migrant
7	Great Cormorant	<i>Phalacrocorax carbo</i>	LC			Full Migrant
8	Green Sandpiper	<i>Tringa ochropus</i>	LC			Full Migrant
9	Indian Pond Heron	<i>Ardeola grayii</i>	LC			Not a Migrant
10	Little Egret	<i>Egretta garzetta</i>	LC			Full Migrant
11	Little Ringed Plover	<i>Charadrius dubius</i>	LC			Full Migrant
12	Red-wattled Lapwing	<i>Venellus indicus</i>	LC			Not a Migrant
13	River Lapwing	<i>Venellus duvaucelii</i>	LC	NT		Not a Migrant
14	Ruddy Shelduck	<i>Tadorna ferruginea</i>	LC	NT		Full Migrant
15	Small Pratincole	<i>Glareola lactea</i>	LC	NT		Full Migrant
16	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	LC			Not a Migrant
17	White-throated Kingfisher	<i>Halcyon gularis</i>	LC			Not a Migrant

Table 4-20: Raptors observed in the proximity of Gaidahawa lake/Gaindatal during field study

S.N	Common Name	Scientific Name	Conservation Status		CITES	Movement Pattern
			Global	National		
1	Cinereous vulture	<i>Aegypius monachus</i>	NT	EN	II	Full Migrant
2	Himalayan Griffon	<i>Gyps himalayensis</i>	NT	VU	II	Full Migrant
3	Osprey	<i>Pandion Haliaetus</i>	LC		II	Full Migrant

Important Bird Area (IBAs)

The Important Bird Area (IBA) found in the country are listed below. The proposed alignment and the project area do not impact any of these areas directly. Nepal, as identified by IBAT, has 27 Important Bird Area (see Table 3 of Annex 1). Of these the nearest to the project area are the Dang Deoukhor forests (about 10 km), Jagadishpur Reservoir a Ramsar Site (12 km), Chitwan National Park (about 50 km) and Lumbini Farmlands (about 20 km) .

4.4.5 Critical Habitat

This section aims to identify critical habitat candidate species within the Ecologically Appropriate Area of Analysis (EAAA) based on the critical habitat criteria defined in the World Bank ESS6. The Critical Habitat criterion in IFC PS6 GN (2019) was used to assist in defining the critical habitat values.

Critical Habitat Criterion

Critical habitat is defined in the World Bank ESS as: the areas with high biodiversity importance or value, including: (a) habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches; (b) habitat of significant importance to endemic or restricted-range species; (c) habitat supporting globally or nationally significant concentrations

of migratory or congregator species; (d) highly threatened or unique ecosystems; (e) ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described in (a) to (d). Critical habitat criteria have been used as defined in PS6 Guidance Note 6 (GN6), Paragraphs GN69 to 97 (updated November 2018). **Table 4.21** provides details of the qualifying requirements for critical habitat criteria 1 to 3 (i.e. thresholds), while details of the likely qualifying interests for Criteria 4 and 5 are defined based on research and expert opinion.

The five criteria are ‘triggers’ in that if an area of habitat meets any one of the criteria, it will be considered critical habitat irrespective of failing to meet any other criterion. Therefore, critical habitat can be determined through a single criterion or where a habitat holds biodiversity meeting all five criteria.

The assessment for critical habitat was undertaken against the criteria defined within the IFC PS 6 Guidance Note, involving interviews with the local experts, field survey and desk-based data collection, including a review of previous biodiversity studies.

Table 4-21: Critical Habitat Assessment Criteria

ESS6 Criterion	Equivalent IFC PS6 Criterion	IFC PS6 GN Thresholds
(a) habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches;	Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	a. Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (0.5% of the global population AND 5 reproductive units of a CR or EN species); b. Areas that support globally-important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a). c. As appropriate, areas containing nationally/regionally-important concentrations of an IUCN Red-listed EN or CR species.
(b) habitat of significant importance to endemic or restricted-range species;	Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	Areas that regularly hold $\geq 10\%$ of the global population size AND ≥ 10 reproductive units of a species.
(c) habitat supporting globally or nationally significant concentrations of migratory or Congregator species;	Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or Congregatory species;	a. Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or Congregatory species at any point of the species’ lifecycle. b. Areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

(d) highly threatened or unique ecosystems;	Criterion 4: Highly threatened and/or unique ecosystems; and/or	a. Areas representing $\geq 5\%$ of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN. b. Other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.
(e) ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d)	No equivalent criteria (Criterion 5: Areas associated with key evolutionary processes)	No set criteria
Note: Endemic Species-an endemic species is one that has ≥ 95 percent of its global range inside the country or region of analysis Restricted-range Species: Species with world distribution of less than 50,000 km		

Critical Habitat Consultation

Consultation meetings with species experts was conducted to determine the current populations, and global/regional distribution and concentrations in the EAAA to inform critical habitat status of the species.

Critical Habitat Screening Result

The field survey, interviews with the local experts and literature review indicated the presence of three critically endangered bird species (*Sarcogyps calvus* [Red-headed vulture], *Gyps tenuirostris* [Slender-billed Vulture], *Gyps bengalensis* [White-rumped vulture] and); one endangered bird species (*Aquila nepalensis* [Steppe eagle]); one critically endangered amphibian (*Indotestudo elongate* [Elongated Tortoise]); and three endangered amphibian species (*Melanochelys tricarinata* [Tricarinate Hill Turtle], *Morenia petersi* [Indian Eyed Turtle], *Aspideretes gangeticus* [Indian Softshell Turtle]) within EAAA, in addition to other five near threatened or vulnerable species. However, considering (i) critical habitat screening applying IFC PS6 thresholds indicated that these CR and EN species are widely distributed in South East Asia and South Asia (the Himalayas and in Nepal), (ii) no nationally and internationally designated protected areas close to the project site (the nearest protected area is located at about 50 km from the BG road and the nearest key biodiversity area is located about 10 km from the road), (iii) limited area of Ecologically Appropriate Area of Analysis (1 km either side of the BG Road), (iv) the proposed works will be carried out within the existing ROW – it is unlikely that there are critical habitats in the project zone of influence of BG road, and the improvements of Butwal – Goringhale section are not expected to affect the global population of these species.

Table 4-22: Critical Habitat Screening

S/N	Scientific Name	Common Name	IUCN Listing	CH Criterion 1	CH Criterion 2	CH Criterion 3	Species information	Critical Habitat Assessment (CHA)
Mammals								
1	<i>Prionailurus viverrinus</i>	Fishing Cat	VU	No	No	No	Global population of Fishing cat unknown. Population is reported declining in the world. Fishing Cat reported relatively widespread in southeast Asia, however, the population stressed particularly due to habitat destruction in southeast Asia	Population of Fishing cat in Nepal is estimated to be 150-200 mature individuals and is likely to occur in most of the Terai Protected Areas such as in Chitwan National Park and Banke National Park. Small population is reported in Jagadishpur Reservoir which is about 12 km distant from the project site. Thus the project EAAA is not considered as a critical habitat of this species
2	<i>Hyaena hyaena</i>	Striped Hyena	NT	No	No	No	Global population of Striped hyaena is estimated to be 5,000 to 14,000 individuals. The population of this species is decreasing as per IUCN Redlist assessment	The population of this NT species in Nepal is estimated to be fewer than 100 individuals with maximal of them restricted in the protected areas such as Banke National Park, Chitwan National Park which are more than 100km and 50km away respectively. Highly limited population is recorded outside the protected areas. The IUCN Nepal Redlist reported the project area as part of the EOO in Nepal along with other districts in Terai flatland up to Koshi River. The pellets of the species were found at one location in field survey however, as per the interview with a forest officer in Gorusinghe Sub-division Forest Office who specializes in the species, this species has never

								seen in the EAAA and does not occur regularly in the project area. Therefore, the EAAA is unlikely to be the Critical Habitat for the species.
Birds								
3	<i>Leptoptilos javanicus</i>	Lesser Adjutant	VU	No	No	No	The EOO of this species is reported 11,300,00km ² with global population of 5500-10,000 individuals. The population of this stork is suggested rapidly declining as a result of a variety threats including hunting pressures, loss of nesting, degradation of its habitat.	This species is widespread in Nepal from east to far west Nepal with population size of 300 to 1000. The project EAAA is not considered as the critical habitat for this bird
4	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR	No	No	No	This critically endangered species has a scattered distribution, found in parts of Southeast Asia and Southern Asia. It has an EOO of 5,230,000km ² and is a resident of Nepal. The global population of mature individuals is estimated at 2,500-9,999.	The estimate of 0.5% of the global population will vary between 12.5–50 individuals. The Project EAAA is small to permanently or temporarily support 13 White-rumped Vultures. Therefore, the Project EAAA does not contain critical habitat for this species.
5	<i>Gyps tenuirostris</i>	Slender-billed Vulture	CR	No	No	No	The EOO of Slender-billed vulture is 2,130,00 km ² with global population size of 730-870 individuals. The population of this species is decreasing in Indian subcontinent largely as a result of feeding on carcasses of animals treaded with veterinary drug diclofenac,	In Nepal, total population size of 50-75 is quantified. Small population recorded from project districts. This species frequents cultivation, open country and around habitation, especially villages. The consultation with Bird Conservation Nepal- Vulture conservation program officials reported, the project EAAA does not qualify Critical Habitat of the species.

							perhaps in combination with other causes.	
6	<i>Aquila nipalensis</i>	Steppe Eagle	EN	No	No	No	This endangered species is found throughout eastern Africa, the Middle East and southern and central Asia. The species has an EOO of	Considering the very large EOO in comparison with the proportionally small EAAA, it is unlikely that the EAAA would sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support ≥ 10 percent of the global population of a species during periods of environmental stress or sustain 0.5% of the global population. Therefore, the EAAA is unlikely to contain Critical Habitat for this species.
7	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	No	No	No	This species is found throughout much of southeast Asia and southern Asia. Although its distribution has been drastically reduced. It is a resident of Nepal. It has an EOO of 7,370,000km ² . Global population of White-rumped Vulture is estimate to be 2,500-9,999. 0.5% of the population will vary between 12.5–50 individuals.	The species was not recorded during the field survey and the Project EAAA is not large enough to permanently or temporarily support 0.5% of the global population of White-rumped Vultures. The consultation with Bird Conservation Nepal-Vulture conservation program officials reported no nesting in EAAA of project site. Therefore, the EAAA is unlikely to contain Critical Habitat for this species.
Herpetofauna								
8	<i>Python molurus bivittatus</i>	Burmese Python	VU	No	No	No	The EOO of this species ranged from India through Nepal to Indonesia and China. The population is decreasing across its native range through harvesting for the skin, traditional medicine and habitat degradation	Within Nepal, Burmese python is well distributed in relatively wet area of flood plains of Terai region. The record of this species in the project area was referenced from the literature and the field survey did not find the presence of this species. Consultation with forest user groups reported this species were rarely seen in Badhare/Budhi forest and Saljhandi-Pipara Forest blocks. the project EAAA is relatively dry and is not considered as a suitable habitat for this species.

								Based on the above, the EAAA is not considered as the critical habitat.
9	<i>Melanochelys tricarinata</i>	Tricarinate Hill Turtle	EN	No	No	No	This species is considered localized, often uncommon, though sometimes locally abundant, especially in Dehradun, India. In Nepal, survey in protected area in the Terai resulted 36 specimens. The population is reported declining.	The presence record of this species is based on the literature and presence was not identified through field survey. The project EAAA does not contain wetlands to be considered as suitable habitat for this species. Therefore, the EAAA is not considered as the Critical Habitat.
10	<i>Morenia petersi</i>	Indian Eyed Turtle	EN	No	No	No	Indian eyed turtle has suffered widespread decline yet have localized population in Terai of India and Nepal. The scarcity across most of its range and collapse of population in recent years suggested that it has almost disappeared from more than half of its range. The population is drastically declining.	The species is particularly noted from the gaidahawa lake/gaidatal of project district for Nepal. Hence, the species could be considered endemic to the lake. The lake is located 12 km away from the project site. Hence, EAAA is not considered as Critical Habitat for the species.
11	<i>Indotestudo elongate</i>	Elongated Tortoise	CR	No	No	No	The population is declined across its range by at least 80% in the last 90 years for habitat loss reasons alone and has additionally been extensively and intensively exploited for consumption and exported trade. It dwells in forest and shrub land	The record of the species is based on the literature. The project EAAA does not contain any streams or wetland which are suitable as the habitat of this species. Hence, the EAAA is not considered as the Critical Habitat for the species.

12	<i>Aspideretes gangeticus</i>	Indian Softshell Turtle	EN	No	No	No	Species resident to Afghanistan, Bangladesh, India, Nepal and Pakistan. Historically widespread and common throughout most of its range, but severely declined elsewhere with likely have reduced to half of its population.	Reported from flatland including project district. This species tends to avoid temporary wetland. Thus, based on field study, the project site is not suitable habitat for this species. The project EAAA does not contain any streams or wetlands which are suitable as the habitat of this species. Hence, the EAAA is not considered as the critical habitat for the species.
13	<i>Aspideretes hurum</i>	Indian Peacock Shell Turtle	VU	No	No	No	Specific population is unavailable. Survey reported it as one of the frequently trades species in the region. It is native to Bangladesh, India, Nepal and Pakistan.	Reported from flatland including project district. The record is based on the literature. The project EAAA does not contain any streams or wetland which are suitable as the habitat of this species. Hence, the project EAAA is not considered as the Critical Habitat for the species.

Note: Ecological Appropriate Area of Analysis (EAAA) , according to IFC PS6, should consider approximate location of the project, area of influence, distribution of species/ecosystems, ecological pattern and functions etc. In the case of the Butwal – Goringhale section, the Indirect Impact Area of 2km (1km from each side of the road) was used as EAAA considering area of influence, status of surrounding forests, rivers and other ecological features and consultation of local wildlife experts.

4.5 Socioeconomic and Cultural Environment (Baseline)

4.5.1 General profile of Project Area

The project is part of the East-West highway and lies in Rupandehi and Kapilvastu districts of Lumbini province. Rupandehi district is one of the major gateways of Nepal from India and Kapilvastu is famous for Lumbini which is birth place of lord Gautam Buddha, a major tourist destination.

The road starts from Butwal of Rupandehi district and passes through Butwal sub-metro-Politan city, Sinamaina Municipality, Kanchan Rural Municipality, Banganga Municipality and Buddhabhumi Municipality and ends at Gorusinghe of Kapilvastu district. The proposed road also links Gautam Buddha International Airport (20 km from Butwal) and Lumbini (12 km from our road), via Bhairahawa which is adjacent with Indian boarder. Most of the road passes through built-up and urban settlements connecting district headquarters and further providing access to outside markets in Terai and India.

Except near Butwal city, the ements along the road are semi-urban and rural. Semi-urban settlements can be seen along the alignment while rural settlements e can be seen little away from road head. The major settlements along the road include, Batauli bazar, Maina Bagar, Naya gaun, Belbas, Nayabasti, Bankatahawa, Murgiya, Rampur, Basgadi, Saljhandi, Fireland, Pipra, Badgaun, Jitpur and Gorusinghe Bazar.

Table 4-23: BG Road (District, Municipality and major settlements)

S.N.	Name of Road Section	Length of the Road (KM)	Name of Province	Covered Districts	Covered Municipality and Rural Municipality	Major settlement/Market area
3	Butwal-Gorusinghe	50	Lumbini	Rupandehi and Kapilvastu	Butwal Metropolitan, Sainamaina Municipality, Kanchan Rural Municipality, Banganga Municipality Buddhabhumi Municipality	Batauli bazar, Maina Bagar, Naya gaun, Belbas, Nayabasti, Bankatahawa, Murgiya, Rampur, Basgadi, Saljhandi, Fireland, Pipra, Badgaun, jitpur and Gorusinghe Bazar. Urban areas are highlighted

Municipality Profile 2020

4.5.2 Demography

Total population of the project districts is 255237, with an average household size of 5.69. Population distribution between males and females is 49.43 and 50.56, respectively. Table 4.34 presents the population composition of project districts.

Table 4-24: Population Composition of Project Districts

SN	District	Total HHs	Total Population	Sex		Average Family size
				Male	Female	
1	Rupandehi	163916	880196	432193	448003	5.37
2	Kapilvastu	91321	571936	285599	286337	6.26
	Total	255237	1452132	717792	734340	5.69

Source: CBS 2011

The project area covers 1 submetropolitian,1 municipality and 1 rural municipality from Rupandehi district and 2 municipalities from Kapilbastu district. Municipalities and detail demographic status of affected municipalities is shown in Table 4.25.

Below table-2 shows total households and population (male and female) of affected municipalities.

Table 4-25: Households and Population Size

SN	Province	District	Municipality	Total HHS	Sex		Total Population
					Male	Female	
1	Lumbini	Rupandehi	Butwal Sub metropolitan	40876	75752	80820	156572
2	Lumbini	Rupandehi	Sainamaina Municipality	15063	29733	32912	62645
3	Lumbini	Rupandehi	Kanchan Rural Municipality	7084	14865	18207	33072
4	Lumbini	Kapilbastu	Banganga Municipality	15894	34833	40309	75142
5	Lumbini	Kapilbastu	Buddhabhumi	11501	31583	33366	64949
	Total			90418	186766	205614	392380

Source: Municipality Profile 2020

Altogether a a total 22 wards of five municipalities of Rupandehi and Kapilbastu districts are directly connected with proposed road alignment and a total of 144914 population from 34971 households are residing in these wards and out of total population 47.08 percent are male and 52.89 percent are female.

Population composition of the affected wards under municipalities is presented in the following table

Table 4-26: Population compositions of the affected Wards under Municipalities.

SN	Municipality	Ward	Total HHs	Sex		Total Population
				Male	Female	
1	Butwal Sub-Metropolitan City	1,2,12,13	8695	16551	18008	34589
2	Sainamaina Municipality	1,2,3,4,5,6,8,9,10,11	14230	26407	29283	55690
3	Kanchan Rural Municipality	5	1326	2699	3253	5952
4	Banganga Municipality	1,2,4,7,8	7954	16200	19043	35243
5	Buddhabhumi	2 and 4	2766	6375	7065	13440
	Total	22	34971	68232	76652	144914

Source: municipality Profile 2020

4.5.3 Caste and Ethnic Composition

The project area has multi-ethnic composition. Brahmin, Chettri, Janjati, Muslim, Madhesi are major groups in the project municipalities. Among the Janjatis major caste are Magar, Gurung, Newar, Kumal and Tharu. In all municipalities there is a presence of Muslims population and Muslims are considered as minority groups in Nepal.

The ethnic composition of both districts is presented Table 4.27.

Table 4-27:: Ethnic Composition of Project Municipalities.

SN	Municipality	Ethnic Group(%)					Total
		Brahmin/Chettri	Janjati(IP)	Dalit	Muslim	Madhesi and other caste Terai	
1	Butwal Sub-Metropolitan City	46.75	34.52	7.02	1.88	9.83	100
	Sainamaina Municipality	46.5	41.6	7.29	2.14	2.65	100
	Kanchan Rural Municipality	31.42	44.07	15.21	0.51	7.22	100
	Banganga Municipality	38.9	47.48	7.04	1.26	5.52	100
	Buddhabhumi Municipality	28.3	41.02	21.35	8.64	9.69	100

Municipality Profile-2020

4.5.4 Literacy Rate

The average literacy rate of male is 70 percent whereas female literacy is 55 percent. Table 5 presents the literacy rate of project districts. Kapilbastu district is quite behind than the Repandehi in both male and female literacy rate.

Table 4-28: Literacy Rate of Project Districts (%)

District	Literacy		Can Read Only	
	Male	Female	Male	Female
Rupendehi	79	61	2	2
Kapilvastu	65	45	4	4

Source: District Profile, 2011The literacy rate of the municipalities are given in the below table

Table 4-29: Literacy Rate

Municipality	Literacy Rate(%)
Butwal Sub metro	89.40
Sinamaina Municipality	87.25
Kanchan Rural Municipality	80.13
Banganga Municipality	84.70
Buddhabhumi Municipality	98.05

Source: Municipality Profile-2020

4.5.5 Religion, Language and Culture

Nepal is multi-lingual, multi-cultural and multi-religious country .Religions practiced in Nepal are Hinduism, Buddhism, Islam, Christianity, Jainism and Sikhism. The majority population, i.e. 81% is Hindu followed by Buddhist (9%) and around 4.4% are Islam and 1.4% are Christian and a nominal number are other religions. The project area also follow almost the same kind of representation as per national figure. Caste wise, the majority population of the project area are Brahmin and Chettri followed by Janjati(Indigenous people).Some Madhesi and Muslims are also found residing in the project area . Madheshi, Muslim and Janjati have their own language and culture. The Nepali language is spoken as an official language and Dashain and Tihar(Deepawali) are being celebrated as a national festival however Buddhist mainly celebrate Loshar and Buddha Jayanti and Janjatis mainly celebrate Maghe and Saune Sakranti except Dashain and Tihar .Holi and Ramadan are celebrated by Madhesi and Muslims, respectively.

4.5.6 Occupational Status

Nepal is an agricultural country and 64% population directly engaged in agriculture farming and among them very few are doing commercial farming rather than subsistence farming. Major occupations of the project area are agriculture, livestock and small-scale business and cottage industry. A Good number of people is found engaged in Government and private employment especially hotel, lodge and other industry. Rupandehi and Kapilbastu are also one of potential tourist destinations due to birth place of Lord Gautam Buddha. Therefore large number of Hotels and lodge and other business are being run in the area

which creates employment opportunity. Due to the capital of Lumbini province is connected with the Indian border, both project districts have gradually emerged as business hubs of the country. However the main occupation of the population is agriculture, followed by trade and wage labor.

4.5.7 Land Value

There have been significant changes in the values of land and properties over a few decades in Nepal including the project area. A large number of stars hotels and industries have been established in this area, therefore the price of the land has been found to increase in the last 5 years. These changes will be further exacerbated by the upgrading of the Butwal Gorusinghe road alignment. Alongside the land use change will be a corresponding increase in both rental and capital values of landed properties on both sides of the upgraded road along the alignment. The increase in demand for residential and commercial use in turn leads to an increase in property values with it's a positive impact on the local community. The major market area which is directly connected with this proposed road is almost found double in comparison to last five years.

4.5.8 Tourism

Tourism in Nepal holds great potential to establish itself as a means of significant economic activity. The project area is one of the main tourist destination due to the Birth place of Lord Gautam Buddha. Due to this reason, a numbers of tourism-based businesses like Hotels, Cottages, Home stays etc. are being conducted by local and by outsiders at different settlements along the road alignment. . A number of Buddha's temples exist in many places which are visited by both national and international tourists.

4.5.9 Non-Timber Forest Product (NTFPs)

Non-timber forest products (NTFPs) are useful substances, materials and/or commodities obtained from forests that do not require harvesting (logging) trees. NTFPs can ability to be produced as commodities for rural incomes and markets, as an expression of traditional knowledge or as a livelihood option for rural household needs, and as a key component of sustainable forest management and conservation strategies. Tharu and other Janjati have traditional indigenous skills and have been involved production of those goods who can be sold in the community. They depend on NTFPs for household subsistence, maintenance of cultural and familial traditions, spiritual fulfilment, physical and emotional well-being, house heating and cooking, animal feeding, indigenous medicine and healing, scientific learning, and income. Only this group of people involved in collection and marketing of NTFPs along the road alignment. No other social groups are found involved in NTFPs based micro-enterprises in the project area. The remaining fraction of caste groups also use NTFPs like wood, firewood, roofing materials, fodder, forage and others.

4.5.10 Historical, Cultural religious and aesthetic sites and values

Historical, cultural, religious and aesthetic sites and values Heritage is anything that is considered important enough to be passed on to future generations. Significant numbers of cultural structures such as temples especially lord buddha and resting place with religious trees (Bar/Pipal – Banyan (Chautaro resting place) occur along the existing highway within a significant distance from the road alignment. All the cultural and religious sites are of public importance. A large number of devotee will visit temple for worship so these structure will be reinstated beyond the RoW. Altogether, 16 temples and along the road alignment will be affected requiring relocation and rehabilitation historically, religiously and archeological important cultural heritages are found to be affected and triggered along the Butwal-Gorusinghe road alignment.

4.5.11 Settlement Patterns

Settlement patterns in the project areas generally reflect the distribution of arable land and the development of market areas. Accordingly, most of the areas exhibit a clustered and semi-clustered settlement. The study area is basically an urban setting. Most of the houses are of modern and semi-modern types except in Kanchan Rural Municipality where large number houses are semi modern .

Table 4.30 shows the types of houses in the study area.

Table 4-30: Type of Houses (%)

S.No.	Municipality	Pakki(RCC /Modern)	Mud, Stone wooden Bonded(semi modern)	Traditional(wooden or mud-mortar)	Not stated	Hot(temporary nature)	Total
1	Butwal Sub-Metropolitan City	47.45	16.56	47.45	34.58	0.14	100
2	Sainamaina Municipality	67	15	16	2	0	100
3	Kanchan Rural Municipality	26.14	64.36	8.8	0.64	0	100
4	Banganga Municipality	48.28	37.78	1.01	0.47	12.46	100
5	Buddhabhumi Municipality	44.06	55.94	0	0	0	100

Source: Municipality Profile-2020

4.5.12 Migration

Migration from hill to Terai and rural area is a common phenomenon in Nepal. With the growing pursuit of better jobs and economic opportunities, better education and health facilities and such other exposures and advantages, Rupandehi district with its headquarters Butwal is always a center of attraction when it comes to migration from hilly districts such as Palpa, Arghakhachi ,Gulmi and other adjoining ones from Dhaulagiri zone. Goringa and some other parts of Kapilbastu are also emerging new settlements drawing droves of people from hilly regions. The trend of in-migration to Kapilbastu is also on significant rise with the spread of historical values of this region mainly owing to Buddha's maternal ties. Additionally based on municipality profile around 15 % of people are absent from both districts living either other district or abroad for employment opportunities.

4.5.13 Basic Utilities and Services

Majority of the sample households of Kapilbastu district have deep well/tube well as the major source of drinking water. On the other hand, majority people of Rupandehi district are enjoying pipe water system. Based on municipality profile, a large number of population of Kanchan Rural Municipality, Banganga Municipality and Buddhabhumi Municipalities are still depend on tube well as source of drinking water and Table 4.31 shows the drinking water facility in the project district.

Table 4-31: Sources of Drinking Water (%)

District	Pipe Tap (%) Source can be served	Deep Well/Tube Well (%) Unserved	Spout (%) spring	Others (%)	Total (%)
Rupandehi	87	9	1	3	100
Kapilvastu	10	85	1	4	100

Source: District Profile, 2011

Table 4-32: Water Supply Facilities

S.No.	Province	Municipality	District	Pipe Tap (%)	Deep Well/Tube Well (%)	Spout (%)	Others (%)	Total (%)
1	Lumbini	Butwal Sub-Metropolitan City	Rupandehi	93.65	1.13	0.5	4.72	100
2	Lumbini	Sainamaina Municipality	Rupandehi	77.72	21.96	0.31	0.01	100
3	Lumbini	Kanchan Rural Municipality	Rupandehi	7.85	90.64	0.51	1.00	100
4	Lumbini	Banganga Municipality	Kapilvastu	19.41	76.23	1.25	3.11	100
5	Lumbini	Buddhabhumi Municipality	Kapilvastu	13.18	85.81	0.4	0.61	100

Source Municipality Profile-2020

The major indicator of sanitation standards in any region is reflected in terms of toilet facility the region has. It is found that about more than 50 percent households have toilet facility. When compared between other five municipalities, majority of Kanchan municipality households are still practicing open defecation. Table 4.33 presents the toilet facility in the study area.

Table 4-33: Toilet Facility (%)

S.No.	Municipality	Flush (Sewerage)	Flush (Septic)	None	Ordinary	Not Stated	Total

1	Butwal Sub-Metropolitan City	80.4	0	0.2	16.58	2.82	100
2	Sainamaina Municipality	6.4	48	0.3	44.8	0.5	100
3	Kanchan Rural Municipality	0	58.51	33.52	7.76	0.21	100
4	Banganga Municipality	0	80	0	17	3	100
5	Buddhabhumi Municipality	0	70.08	5.16	24.76	0	100

Source: municipality profile 2020

4.5.14 Energy Use

Electricity is the main source of lighting energy contributing more than 90 percent. Other sources of lighting energy are kerosene, solar etc.. Table 4.34 shows the sources of energy used for lighting purposes.

Table 4-34: Sources of Energy for Lighting (%)

S.No.	Municipality	Sources Energy for Lighting (%)						
		Electricity	Kerosene	Solar	Bio-gas	Not stated	others	Total
1	Butwal Sub-Metropolitan City	98.55	0.29	0.87	0.03	0.02	0.24	100
2	Sainamaina Municipality	99.38	0.23	0.24	0.09	0	0.06	100
3	Kanchan Rural Municipality	93.05	6.44	0.05	0.07	0.17	0.22	100
4	Banganga Municipality	93.32	0	0	0	0	6.68	100
5	Buddhabhumi Municipality	92.93	0	0	0	0	7.06	100

Source: Municipality profile 2020

A large number of Butwal and Sinamaina population depend on LPG compared to other municipality. Table 4.35 presents the sources of energy for cooking.

Table 4-35: Sources of Energy

S.No.	Municipality	Source of Energy for Cooking (%)							
		Wood	LPG	Kerosene	Cow Dung	Bio-gas	Electricity	others	Total

1	Butwal Sub-Metropolitan City	3.76	95.86	0.04	0.01	0.25	0.05	0.03	100
2	Sainamaina Municipality	5.83	91.67	0	0	0.09	2.35	0.06	100
3	Kanchan Rural Municipality	82.68	9.89	0.07	3.86	3.1	0.01	0.39	100
4	Banganga Municipality	72.4	13.78	0.4	1.84	10.76	0.03	0.79	100
5	Buddhabhumi Municipality	54	8	0	1	1	0	36	100

4.5.15 Ownership of Property

As Nepal is basically a patriarchal society, male members mainly own household property. However, there are some variations within the country, mainly due to cultural reasons. For instance, the empowerment of women within the family is considered high among indigenous people compared to other caste groups. As far as national policy, the government has introduced in the Fiscal year 2004 a rebate of 10% in the cost of land deeds registration fee when the deed is in the name of women. This has led to an increase in landownership among women. The rebate has now increased to 20 % since 2005. The census report 2011 shows that women's ownership of land rapidly increased to 19.71% in 2011 from 9.11% in 2001. The national figure of the ownership of the property of women is increasing. However, women do not have the actual right to utilize their property in practice. The scenario of the increasing ownership of land has reciprocal relation with more male engaged in foreign employment and discount in land tax to women while registering the land. The changing ownership of property from men to women has also contributed to a change in social status.

4.5.16 Status of Women & Disadvantaged Group

Nepal has high incidences of GBV cases with mostly women as victims. Out of the 15 most GBV prevalent countries in the world, Nepal ranks 4th in domestic violence and violence by a partner.¹³ The current status of gender inequality and gender-based violence in Nepal reveals the serious need to mainstream gender sensitivity and GBV risk mitigation measure at all organization levels and all phases of project cycle. In Nepal, GBV is prevalent due to unequal gender relations and discrimination towards women in both public and private sphere. It has direct implications on the reproductive health status of women and physical, emotional, and mental health of their children

The overall situation of women in Nepal is far behind when compared with their male counterparts. They are still discriminated and exploited by their own family members. With son preference, social stigma and other prevailing biases still doing rounds; women's mobility, public participation, exposure and orientation are controlled and censored by patriarchal parameters. Participation of rural women is more in household daily drudgeries such as fodder collection, cooking, childcare etc. Thus, they are deprived of making substantial decisions and other avenues of upward mobility.

Rupandehi district has a relatively higher literacy rate as compared to Kapilbastu. Hence, women in Rupandehi have more exposure, opportunities and outlets in different walks of life such as economic generation, participation in public forums, making their voices heard and others. This part is lagging somewhat behind in case of Kapilbastu women. Moreover, some underlying social ills like practice of

witchcraft have also retarded many of them and such bad practices are institutionally sustained to keep women away from the path of progress and enhancement.

The growing trend for abroad jobs has rendered both positive and negative changes. Many households' economic condition has been somewhat better thus enabling them to afford children's education, better healthcare, sanitation and career choice. On the other hand, access to constant resources has led to conflict, disharmony and even divorce in the worst situation.

Dalit women's are, on the other hand, bearing the brunt of double burdens: untouchability and patriarchy. In both districts, the untouchability issue is significantly more in rural areas than in city centers. Being poorer and landless, Dalits are highly marginalized. Lack of education, job opportunity, economic condition, and health facilities are contributing factors for their lower status than other ethnic groups. Also Dalit children's school enrollment is yet to improve.

4.5.17 Profile of Project Affected People

Project Affected HHs

In total, 108 households will be affected by the Butwal -Gorusinghe Road improvement works due to partial encroachment within the right of way (details are given in Chapter 5). Out of total affected households (55HHs), 61.11 percent belong to Brahmins/Chettri followed by Janajati(IP) (25.56%), Dalits (3.33%) and Muslims religious minority group (8.89%). Among the surveyed project affected HHs, 97.78% HHs are headed by males and remaining 2.22% by females.

Demographics of project affected surveyed households

Out of the impacted population, 51.72% and 48.28% are males and females respectively. Surprisingly, the female population of the affected surveyed HHs is less than males and the national figure of 51.72%. The average size of households of the project affected surveyed households is 5.5, greater than the national average of 4.8.

Occupational Status

Among the economically active population of the project affected surveyed households (90), overwhelming majority of them are engaged in business (64.67%) followed by service (24.33%), foreign job (9.69%), and agriculture (1.11%). The largest fraction of the economically active population is engaged in business. Major businesses are hotels, grocery shops, construction materials shop, petrol pumps, etc.

Households Income Among the total affected households 7 household's per capita income is less than NRs 35,738 (national thresholds for the year 2021 and 2022) so these 7 households are identified as below poverty households. In other words 7 household's income is less than NRs 171542.4 so these households are considered as BPL households.

Vulnerable and disadvantaged groups, communities and individuals

Vulnerable groups are those who experience a higher risk of poverty and social exclusion than the general population. Dalits, ethnic minorities, women headed households, below poverty level income households and aged member households are categorized under vulnerable. 9 households are revealed to fall under vulnerable groups along the road alignment. Out of total vulnerable HHs identified, 2 HHs are headed by women categories. No endangered and highly marginalized IP groups are found along the alignment. However Gurung, Rai, Newar and Chaudhary were found along the alignment and they are not found the criteria set by WB ESS documents.

Vulnerability of project affected families

Vulnerability has long been recognized that some people are more likely to be impacted adversely by construction works than others and least able to react effectively. The causes of vulnerabilities might be physical, social, political, demographic, economic, environmental and attitudinal. The vulnerability of IPs and VCs within ROW along the road alignment is attributed to loss of private property like housing structures, falling to deprived and disadvantaged groups category and households being headed by women counterparts along the road alignment

Indigenous People in the Project Area

There are four IP communities along the road alignment, namely, Newar, Magar, Chaudhary and Rai which are living in the project area. However, these groups are all outside the RoW where the project intervention will take place. The project will not cause any direct adverse impact to their land, will not cause any relocation of IPs from land they customarily use or occupy, and it will not cause negative impacts to their cultural heritage.

5 Potential Environmental and Social Impacts and Risks and Their Mitigation

5.1 Impact Assessment Methodology

Potential environmental and social impacts were identified on the basis of a review of feasibility study reports, field visits, stakeholder consultations, and experiences from the construction of road projects in Nepal. The significance of potential impacts was assessed using the criteria and methodology given below.

Impact Magnitude

The potential impacts of the project have been categorized as major, moderate, minor or minimal based on consideration of the parameters such as: i) duration of the impact; ii) the spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria.

The magnitude of the potential impacts of the project has generally been identified according to the categories outlined in **Table 5.1**.

Table 5.1: Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Minimal
Duration of the potential impact	Long term Beyond the life span of the project	Medium Term The lifespan of the project	Limited to the construction period	Temporary with no detectable potential impact
The spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond immediate project components, site boundaries or local area	Within project boundary	A specific location within the project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	The potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable

Parameter	Major	Moderate	Minor	Minimal
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Occurs under worst-case (negative impact) or best case (positive impact) operating conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to occur

Sensitivity of Receptor

The sensitivity of a receptor has been determined based on a review of the population (including proximity / numbers / vulnerability) and the presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. The criteria for determining receptor sensitivity of the Project's potential impacts are outlined in **Table 5.2**.

Table 5.2: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very High	The vulnerable receptor with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
High	The vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Medium	The vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low	The vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

Assigning Significance

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor have been determined and the significance of each potential impact established using the impact significance matrix shown in **Table 5.3**.

Table 5.3: Criteria for Determining Significance of Impacts

Magnitude of Impact	Sensitivity of Receptors			
	Very High	High	Medium	Low
Major	Critical	Major	Moderate	Minimal
Moderate	Major	Major	Moderate	Minimal
Minor	Moderate	Moderate	Minimal	Minimal
Minimal	Minimal	Minimal	Minimal	Minimal

5.2 Summary of Assessed Impacts

The project's potential impacts and their significance have been assessed using the methodology described in Section 5.2 above. A summary of these impacts and their significance are presented in **Table 5.4** along with the key mitigation measures. A detailed assessment of impacts and proposed mitigation measures are given in the subsequent sections.

Table 5.4: Potential Impacts and their Significance

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
Environmental and Social Considerations in the Project Design					
1. Improvement in Road Safety (at 4 major junctions, 12 minor junctions and 12 major villages/bazars)	Very High	Major	Critical beneficial	• Raised pedestrian footpaths and cycle lanes in urban areas • Installation of traffic lights in all major intersections along with zebra crossings and road humps • Foot bridges at six locations at intersections where schools, colleges and hospitals are located • Other safety measures such as provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots including pedestrian foot paths in market areas • Universal access measures for disabled and elderly	Critical beneficial
2. Protection of landslides and river bank erosion (Landslide, gully erosion and old slide scarp can be seen from Ch 590+000 to 591+000. Mainly Ch 590+550-990+600-590+700, 590+800, 591+000 is found active landslides, and gully erosion, river bank cutting at Ch 610+100, 611+000, 621+420, 640+200)	Very High	Major	Critical beneficial	• Implementation of Bioengineering and retaining structures specifically RCC Modified Wall, Geo-Grid Wall and Semi-Flexible 3D Galvanized Steel Mat. Other measures such as terracing and weep holes to maintain sub-surface drainages etc. will also be implemented • Avoid haphazard excavation of slopes. • Bank protection works near the proposed bridge sites • Stabilizing the excavated slopes and river banks with retaining structures	Critical beneficial
3. Impact on Wildlife Movement KM 635+200 (8130m) and KM 637+720 to KM 639+000 (1280m)	High	Moderate	Major	• Reinstallation of existing fences affected by widening in the forest areas. • Construction of new wild-life friendly fences in the forest areas near Gorusinghe • Speed limits in the forest areas (limit to 40 km per hour) with warning sign boards • Two Box culverts for snake and turtle crossing (last one kilometer section)	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
Environmental impacts due to Project siting					
1. Improvement of Trade and Communication between Nepal and neighboring countries.	Very high	Major	Critical beneficial	Implementation of the ESMP and RAP to mitigate impacts associated with the construction of the project	Critical beneficial
2. Clearance of about 28 ha of forest along 15.2 km of road (located in the forest areas) 9386 trees will be felled from community forests collaborative forest, government managed forest and public land/settlement area (7186 forest trees and 2200 trees in other sections of ROW)	Medium	Major	Moderate adverse	• Compensation for the Department of Forests for replantation of trees in the same areas (at a ratio of 10 new trees per each tree cut. • Provision of a budget of USD 0.6 million for above plantation programs	Plantation of trees in the in the median of the road by contractor (about 16,000 trees) Minimal adverse
3. Impact on existing public utilities such as drinking water supply pipelines, electrical poles, power lines and telephone lines, resting places, tube wells, access roads to some villages	Very high	Major	Critical adverse	• Tube wells - new tube well before demolishing the existing one • Water supply lines – contractor will relocate the pipelines beyond the ROW – provision in the engineering costs • Electric poles and power lines – coordination with Nepal Electricity Authority for relocation • Telephone lines – Communication Department • Resting places – Coordination with local government. These resting places are around the trees • Access roads – Realign the roads before demolition of the existing roads	Water supply lines – contractor will relocate the pipelines beyond the ROW – provision in the engineering costs Electric poles and power lines – coordination with Nepal Electricity

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
					Authority for relocation Telephone lines – Communication Department Resting places – Coordination with local government. These resting places are around the trees Minimal adverse
4. Impact on Wildlife	High	Minor	Moderate adverse	• Relocation of the existing Fencing of Saljhandi-Pipara forest that will be affected by the road widening. • Installation of fencing in the Gorusinghe Forest to avoid entry of animals on the road • Conduct additional field surveys/monitoring to better capture the mammal movement/roadkill in the forest blocks. • Construction of under passes for reptile movement at Bodhi forest • Developing Underpass structures under Kothi river in Saljhandi-Pipara forest • Installation of larger culvert in three forest areas (in total 20)	Minimal adverse
Social impacts due to Project siting					

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
4. Partial Impact on 98 structures residential and commercial structures (mainly in verandas/front portions of structures) Relocation of 4 residences No land acquisition in the ROW	Very high	Major	Critical adverse	- Adequate compensation for affected households as per the entitlement matrix in the RAP. - Implementation of income and livelihood restoration activities - Implementation of a social development plan.	Minimal adverse
Environmental impacts and risks during construction					
1. Generation of spoils from excavation works for road widening and removal of road material from existing damaged roads(0.27 million cubic meters of cut material)	Minor	Minimal	Minimal adverse	Existing excavations will be reused for filling purposes. The filling volume is required is 1.17 billion cubic meters	Minimal A
2. Generation of construction waste including hazardous waste Unused bitumen and concrete Lubricants, used oils,	High	Moderate	Major adverse	- Containers of adequate size and numbers in place for collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) - Procurement of services of a waste management contractor for transport and treatment of recyclable and hazardous waste - Empty containers will be returned to vendors	Minimal adverse
3. Generation of solid waste from campsites and offices (about xx kg per day). 500 workers per day - 200 from local community and 300 from outsiders, who reside in camps.	Very High	Moderate	Major adverse	- Implementation of the waste management plan - Segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Placement of containers with adequate size and numbers. - Organic waste will be treated through on site composting, in-vessel composters - Recyclable waste will be compressed through bailers and use services of the vendors - Disposal of the garbage at the local municipal disposal site	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
4. Wastewater discharges from the construction camps, sites, and batching plants	Medium	Moderate	Moderate adverse	- Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and at the worksites (sedimentation tanks for batching and crushing plants and discharges from site drainage) - Monitoring of wastewater quality to ensure compliance with World Bank EHSs	Minimal adverse
5. The potential risk of soil and water pollution by construction works	Medium	Moderate	Moderate adverse	- Storage of fuels and chemical in contained facilities - Availability of spill kits and trained personnel for immediate cleanup of any oil spills	Minimal adverse
6. Air and noise pollution from construction and traffic	Very High	Moderate	Major adverse	- Air and noise pollution control measures at the worksites and regular monitoring of ambient and noise quality to ensure compliance with National Ambient Air Quality Standards and Noise Standards - Compliance with Nepal Vehicle Emission Standards 2012 on vehicle and machinery emissions	Minimal adverse
7. Sourcing of borrow material (about 1.17 million cubic meters) for earth embankment and aggregates (about 2.2 million cubic meters) for road (including base and subbase) and bridge works	High	Moderate	Major adverse	- Reuse of excavated material to the extent feasible - Use of licensed quarry sites - Use of dry river beds	Minimal
8. Impact on river habitat due to quarrying and bridge construction (Banganga River, Tinau River, Dano River, Kanchan River)	High	Moderate	Major adverse	- Control of wastewater and sediment releases to the river - Using dry river beds for excavation - Using licensed quarry sites - No quarrying during the rainy season or high flow seasons - Restoration of the borrow sites after completion of the works	Minimal
9. Impacts on flora, including community forests	High	Minimal	Minimal adverse	- No siting of any temporary facilities with the forest areas - Use of non-wood fuel for cooking and heating	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				- Code of conduct for workers and employee's protection of flora and fauna and a ban on tree cutting and hunting. Any violation to code of conduct leads to strict punishment including termination of employment - Awareness-raising to workers on the wildlife	
10. Impact on fauna, including wildlife movement	High	Moderate	Moderate adverse	- Installation of fence and culvert at forest areas - Additional ecological survey on mammals and herpetofauna during detailed design - Capacity building and awareness raising of forest communities - Compensatory tree plantation - Continuous monitoring of animal crossing and road kills in the forest areas - Avoiding contractor facilities near the forest areas	Minimal adverse
Occupational Health and Safety Risks					
11. Occupational safety risks on workers due to hazards associated with the construction activities (instream, mountain slopes, working on heights and trenches, cold weather, etc.)	High	Moderate	Moderate adverse	- Development and implement occupational health and safety plan - Regular training program for workers on occupational health safety (monthly training and daily toolbox talks) - Incident investigation and reporting - Conduct a 'job hazard analysis' at the new construction site to identify potential hazards and implement necessary control measures. - Use of relevant personal protection equipment at all times - Availability of firefighting, fully equipped ambulance, first-aid and rescue facilities at the site	Minimal adverse
12. Potential health risks due to inadequate facilities in the campsites (about 300 non-locals, live in construction camps)	High	Moderate	Moderate adverse	A construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, recreation) for labor. Cleaning of the campsite on a daily basis.	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				- The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan - Drinking water complying National Drinking Water Quality Standard 2005	
Social Impacts and risks during construction					
13. impact on traffic from road construction and temporary traffic diversion. Increased traffic congestion and safety hazards due to increased traffic on local roads especially for children and elderly people	High	Moderate	Major adverse	- Implement a traffic management plan (e.g., avoiding school hours, following speed limits, hiring licensed drivers, etc.) including awareness-raising and safety measures - Carry out road safety campaigns along the RoW	Minimal adverse
14. Community exposure to work hazards and communicable diseases such as HIV/AIDs, COVID-19 (about 19 villages and bazars along the project road)	Very high	Moderate	Major adverse	- Barricade the work areas (near the settlements) with hard fencing to prevent the entry of community in the construction areas. - Placing adequate signboards and flagmen to divert the community away from the construction works. - Community awareness programs on construction-related hazards, including awareness programs in schools	Minimal adverse
15. Dust from earth works and construction vehicular movement and construction equipment	Very high	Moderate	Major adverse	- Frequent sprinkling as per weather requirements of water on the local roads and worksites to control dust emissions - Dust control measures at the worksites	Minimal adverse
16. Employment generation for the local community (mostly construction related jobs)	Very high	Moderate	Major beneficial	- The hiring of the local community during construction works (about 300 workers on average regularly and about 500 during peak construction for five years) - Implement a labor management plan - Formal contracts to be signed with labor.	Major beneficial
17. Risk of child labor	High	Minimal	Minimal adverse	No hiring of workers less than 18 years of age	Minimal adverse

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
18. Impacts from labour influx and potential cultural conflicts between communities and workers	High	Moderate	Moderate adverse	- The contractor's code of conduct shall cover a program to promote awareness to the construction workers on respecting the local community. - Construction camps will be built in the designated areas, located away from the local settlements - The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community - Follow COVID-19 protocols.	Minimal adverse
19. Risk of gender-based violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH)	High	Minimal	Minimal adverse	- Community sensitization. - Socio-economic development of women. - Orientation to labour force. - Code and conduct to guide the workers on how to relate with the community. - Orientation of Supervision Consultant, and Contractors on GBV - Mapping of GBV service providers for prevention and response. - Develop and implement a GBV Action Plan.	Minimal adverse
Environmental and Social impacts during Operational stage					
1. Workers health and safety during maintenance	High	Moderate	Moderate adverse	- Establishment of work zones to separate workers on foot from traffic and equipment - Reduction of vehicle speeds in construction areas - Training of workers	Minimal adverse
2. Community health and safety during maintenance	Very high	Minor	Moderate adverse	- Provision of safe corridors for pedestrian movement - Traffic calming measures - Road safety signs	Minimal adverse
3. Impact on Flora and Fauna	High	Minimal	Minimal adverse	Recording the road kill at three forest blocks in coordination with divisional forest offices	Major beneficial

The impact of various activities	Sensitivity	Magnitude	Significance Prior to Mitigation	Key Mitigation and Enhancement Measure	Residual Significance
				• Monitoring the use of culvert by wildlife species, especially snakes and other reptiles • Assessment of need of additional culvert/wildlife crossing structures long the road based on the monitoring result • Compensatory plantation (including monitoring and maintenance of saplings) • Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking • Regular inspection and maintenance of fencing installed/maintained in the forest areas • Maintain speed limits and sign boards	

5.3 Environmental Issues Mainstreamed in the Project Design

Environmental and social aspects have been considered in the planning and design of the Project facilities. These include:

- Road safety has been considered all along the road especially at the major and intersections with the local roads and near the major villages and market areas. These measures include:
 - Raised pedestrian footpaths and cycle lanes in urban areas
 - Installation of traffic lights in all major intersections along with zebra crossings and road humps
 - Foot bridges at six locations at intersections where schools, colleges and hospitals are located
 - Other safety measures such as provision of road signs, delineators, barriers and pavement markings, minor realignment at identified black spots including pedestrian foot paths in market areas.
 - Universal access measures for disabled and elderly for accessing the footbridges and road crossings.
- Protection of landslides and river banks from erosion
 - Implementation of Bioengineering and retaining structures specifically RCC Modified Wall, Geo-Grid Wall and Semi-Flexible 3D Galvanized Steel Mat. Other measures such as terracing and weep holes to maintain sub-surface drainages etc. will also be implemented
 - Avoid haphazard excavation of slopes.
 - Bank protection works near the proposed bridge sites
 - Stabilizing the excavated slopes and river banks with retaining structures
- Impact on wildlife movement
 - Reinstallation of existing barbed wire fences affected by widening in Saljhandi-Pipara forest.
 - Construction of barbed wire fence in the forest areas near Gorusinghe
 - Speed limits in the forest areas (limit to 40 km per hour) with warning sign boards
 - Two Box culverts for snake and turtle crossing (last one kilometer section)
 - Developing Underpass structures under Kothi river in Saljhandi-Pipara forest

5.4 Impacts from Project Siting

5.4.1 Environmental Impacts from project siting

5.4.1.1 Improvement of Trade and Communication

The proposed road upgrading works will improve the connectivity on the East-West High and the trade with the neighboring countries. The road is located (within 20km) close to three border crossing points (Belhiva, Kanuwa and Krishnanagar) with India. The road provides quick access to the Butwal city, and its educational, medical and other emergency facilities. The implementation of proposed project will address the existing environmental problems along the proposed alignments such as landslides, dust pollution and waste management. The life of vehicles will be increased due to the improved road conditions. The price of adjacent lands after the improvement of transportation corridor will increase significantly, especially in the places with fertile soils and scenic landscapes due to increase in economic activities. The land owners will be benefited directly with the increment in the price of land. More shops, hotels and other economic

activities will be developed along the new proposed highway alignment. The poor people will be benefited indirectly through growth of demand in jobs such as services, agriculture and industry.

5.4.1.2 Loss of Forest Vegetation

The road alignment of the project falls in the tropical zone with the forest dominated by *Shorea robusta* (Sal) forest and patches of *Dalbergia-Acacia* forest along the riverine sections. The major blocks of forest area are distributed from the chainage KM 611+870 to KM 617+730 (5860m) in the Rupandehi district. The other major forest zones are KM 626+970 to KM 635+200 (8130m) and KM 637+720 to KM 639+000 (1280m) in the Kapilbastu district. The proposed road widening in this 15.2 km road length require clearing of about 28 of forest and felling of 7186 forest trees. In addition 2200 road side trees from other sections of the road will also be removed. The affected trees in the forest are mainly wood trees. The trees along the other sections of the road are also wood and ornamental trees.

Details of affected trees are given in Table 5.5. Out of 9386 trees, 5,517 are trees, 1,691 are pole size and 2,255 are saplings. From forest 7,109 number and from public land total 2,277 number will be loss. As shown in table maximum number of trees will be removed from Tilaurakot collaborative forest whereas minimum tree loss will be Mayadevi community forest. This shows that due to road construction causing significant loss of tree volume and biomass. The project will apply the mitigation hierarchy to avoid, minimize, mitigate and compensate of damage to forest and trees needing to be cut.

Table 5-5: Total Number of Tree Loss In terms of Land Ownership from RoW of BG Road

Land ownership	Number of Trees			
	Sapling	Pole	Trees	Total
Majhaura Community Forest	36	23	2	61
Nabajagriti Community Forest	9	96	103	208
Pragati Community Forest	107	16	178	301
Saljhandi Community Forest	46	33	164	243
Shanti Community Forest	34	109	133	276
Tilaurakot Collaborative Forest	1648	478	1283	3409
Butwal Community Forest	0	4	405	409
Jiteshowr Community Forest	1	0	214	215
Mayadevi Community Forest	2	0	32	34
Mayadevi Collaborative Forest	90	19	1566	1675
PiprakotMahila Community Forest	1	0	21	22
Siva mandir Community Forest	0	0	16	16
Government Forest	44	134	139	240
Public land/Settlement	237	779	1261	2277
Total	2255	1691	5517	9386

2,136 number of *Shorea robusta*(Sal) tree will be loss from all type of forest during road upgrading, which is highest number in terms of species loss. Sal is one of the most important sources of hardwood timber in Nepal. 70 numbers of *Ficus religiosa* (Pipal) will be loss which is used by local people for resting places along the settlement area. 4 numbers *Pterocarpus marsupium*(Indian kino) will be loss which is important as per conservation.

Mitigation

DRO will implement the following compensation and enhancement measures:

- The loss of vegetation from forests will be compensated through cash compensation to the Forest Department for the loss of trees and replantation of trees (a mandatory requirement of planting 10 new trees of indigenous species per each tree cut).
- The project will develop tree plantation in the median of road. About 1,000 native tree species will be planted all along the median (distance between each tree is 3m). The tree plantation will be carried out by the contractor and will be later maintained by DOR
- A budget of USD 600,000 has been allocated in the project budget for the above measures. Details of activities to be implemented under this budget will be worked out during the project implementation by the E&S staff of DCID in consultation with the forest and wildlife departments, and the final list of activities will be shared with the World Bank prior to their implementation.

With the above compensation and enhancement measures, the residual impacts of vegetation clearance have been assessed as minimal.

5.4.1.3 Impact on Public Utilities

The proposed widening works Impact on existing public utilities such as drinking water supply pipelines, electrical poles, power lines and telephone lines, resting places, tube wells, access roads to some villages. These affected utilities are

- Solar street lights – 55
- Tap – 46
- Telephone pole – 328
- Transformers – 67
- Electric pole (concrete) – 1646
- Electric pole – steel – 163
- LT line – 53

If the public utilities are not located prior to construction works, there will be significant impacts on the public services provided to the local communities.

The DOR will take the following actions to address the utilities relocation. These works will be carried out through the road contractor prior to the start of main construction works. The DOR will coordinate with the relevant agencies for utility relocations.

- Tube wells - new tube well before demolishing the existing one
- Water supply lines – contractor will relocate the pipelines beyond the ROW – provision in the engineering costs
- Electric poles and power lines – coordination with Nepal Electricity Authority for relocation
- Telephone lines – Communication Department
- Resting places – Coordination with local government. These resting places are around the trees
- Access roads – Realign the roads before demolition of the existing roads

5.4.1.1 Impact on Wildlife

The project road is not passing through any wildlife corridors. However, some road kills are reported in the three forest zones that road crosses which provide habitat for some mammals (not threatened species). Road kills of some animals such as jackal and jungle cats, are reported in the Gorusinghe Forest area. Road kills of snakes and frogs are reported in Bodhi forest zone. No road kills are reported in Saljhandi-Pipara forest block since it already has a fencing on both sides of the road. However, the existing fence is barbed barbwire fence may injure the animals during the night. The existing box culverts and bridges in the highway, primarily at the forest areas, are serving at the underpass for wildlife movement; installation of wider box culverts will further minimize the wild mammal road kill. The proposed road improvement works may pose more risks to the animals, and these impacts area assessed as moderate.

Mitigation

Following measures will be implemented to address road kills of mammals

- Select the design and location of wildlife compatible fencing in the forest blocks
- Identify the location and type of wildlife crossing structure along the road alignment
- Incorporate the recommended wildlife crossing structure and location into the detailed road design
- Selection of compensatory planting location considering ecological connectivity and potential wildlife movement
- Bridge foundation design considering terrestrial and aquatic species movement and habitat
- Conduct additional field surveys/monitoring to better capture the mammal movement/roadkill in the forest blocks

Following measures will be implemented to address road kills of reptiles

- Conduct additional field survey/monitoring to better capture the risks on herpetofauna species due to the current road operation and potential impacts due to the road upgradation especially at three forest blocks. Survey should be conducted before the completion of detailed design for the road upgradation.
- Identification of suitable location for fencing and installation of culvert/tunnels.
- Two spots with snake road kill (83.009863°E 27.657455°N; mileage-638+760 and 83.003008°E 27.656003°N; mileage-639+450) was recorded in Badhare forest block during the field survey. While the forest block is degraded, it is in the process of restoration after being transferred as community forest. The forest block extends for 1.28 kilometers (Mileage from 637+720 to 639+000). Two herpetofauna tunnels in the Badhare forest block will be installed to minimize the snake road kill.

5.4.2 Social Impacts from Project Siting

5.4.2.1 Land acquisition and Resettlement

The project will partially affect a total of 99 private structures and fully affect 4 structures from 108 households and all these affected structures have been constructed by encroaching the right of way of the existing road. Therefore, these structure owners are non-title holders. Among the total affected households, 4 residential structures and 1 commercial structure will be fully affected and need to be compensated and relocated. The affected commercial households have been used only for commercial purposes therefore only 4 residential households will be physically displaced along the alignment. Out of total affected households 17 households were absent during the survey. Additionally, 162 public

structures (such as bus shelters and resting places around the trees) will be impacted and need to be shifted beyond the RoW . The details of the impacted structures are given in Table 5.5.

Table 5.5: Resettlement Impacts of the Project

SN	Affected Structure	Total Number of Affected structures	Households	Affected Status		Nature of Impacts
				Fully Affected	Partially Affected	
1	Residential	38	43	4	30	Encroachment of verandas/front porches of the houses in the ROW
2	Business	17	17	1	16	Same as above
3	Residential cum Business	48	48	0	48	Same as above
	Sub Total	103	108	4	82	Same as above

Source: Loss Inventory Survey Jan 2022

Location of the affected private structures are given in Table 5.6. Most of the affected structures are located near Butwal urban areas

Table 5.6: Locations of affected private structures

SN	Structure	Municipalities					Total
		Butwal	Sainamaina	Kanchan	Banganga	Buddhabhumi	
1	Residential	23	6		8	1	38
2	Business	12	4		1		17
3	Residential cum Business	23	15		6	4	48
		58	25		15	5	103

Details of public structures affected by the road widening are given in Table 5.7. Most of the structures are roadside bus shelters (for waiting and resting of travelers and locals) and sitting platforms around the pipal and banyan trees (locally called as *Chautaro*).

Able 5.7: Details of Affected Structures.

SN	Structure	No structure of	Impact Type	
			Fully impacted	Partial Impact
1	School Rented Building	1		1 (wall)
2	Temple	19	3	16
3	Waiting/Resting place	68	8	60
4	<i>Chautaro</i> (platforms around trees)	61	6	55
5	Public toilets	2	1	1
6	Buddha Statue and Park	4	1	3
7	Police bit	1		1
8	School Gate	1	1	
9	Mani Mukunda Boading temp. Building	1		1
10	Lions Eye hospital building(temp)	1		1
11	Health Care Centre(Snake bite)	1		1
12	Transport entrepreneur office	1		1

SN	Structure	No of structure	Impact Type	
			Fully impacted	Partial Impact
13	Maya Devi Technical school(kitchen)	1		1
	Total	162	20	142

Source: Loss Inventory survey 2022

Mitigation

A Resettlement Action Plan (RAP) will be prepared to address and mitigate the impacts on the affected households. The objective of the plan is to improve or at least restore the income and livelihood conditions of the people to at least the pre-project level. The households affected will not only receive cash compensation for land and other assets at prevailing rates for full replacement cost, but also additional assistance will be given for relocation and livelihood restoration. Overall, the RAP presents (a) socio-economic profile of the affected settlements; (b) type and extent of loss of assets; including land, structures, and trees; (c) principles and legal framework applicable for mitigation of these losses; (d) the entitlement matrix; (e) income and livelihood restoration program; (f) relocation and resettlement budget; (g) institutional framework for the implementation of the plan, including monitoring and evaluation.

The livelihood impacts on the affected businesses and

- Compensation will be paid to the affected households for lost income from businesses and trees in accordance with RAP. Additional cash compensation will be paid to vulnerable households.
- Livelihood restoration measures will also be implemented in accordance with the RAP
- Provision of temporary employment in the construction works

With the above mitigation measures, the residual impacts on resettlement and livelihood have been assessed as minimal.

5.5 Environmental Impacts and Risks during Construction

5.5.1 Generation of spoils

Excavations for earth works for road widening and drainage structures and removal of road material from the damaged sections of existing roads will generate about 0.27 million cubic meters of cut material. Most of the cut material can be used as fill material for embankment construction and road material can be used as the base or subbase or for retaining structures provided the fragmented rock meets the quality standards needed for the work. Disposal of spoils is not anticipated due to potential use of all cut material.

Mitigation

The contractor will implement the following mitigation measures to minimize the generation of spoils:

- Minimize the generation of spoils by reusing it for construction of road embankment
- recycling the excavated road material to the maximum extent possible by using them as the aggregate material in the base subbase, concrete works, and filling of embankments and retaining structures
- If spoil disposal is needed, the borrow sites developed for the project will be used as spoil disposal sites. The spoils will be used for the restoration of the borrow sites.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.2 Generation of Construction and Hazardous Waste

The construction works generate large quantities of excess materials from construction sites (concrete, discarded material, etc.) and wastes from workers camps and construction yards, including other debris. In addition, small quantities of hazardous waste will also be generated mainly from the vehicle maintenance activities (liquid fuels; lubricants, hydraulic oils; chemicals, such as anti-freeze; contaminated soil; spillage control materials used to absorb oil and chemical spillages; machine/engine filter cartridges; oily rags, spent filters, contaminated soil, etc.). It is imperative that such waste is responsibly disposed to avoid adverse environmental and human health impacts.

Mitigation

The following mitigation measures will be implemented:

- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan, including hazardous waste management and submit it to the PMU for their review and approval. The plan will cover - manage hazardous material use, storage, transport, and disposal.
- The contractor will place containers of adequate size and numbers in place for the collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) from the worksites, and transport these wastes regularly to a centralized facility.
- The contractor will return the empty containers to the suppliers.
- Handling chemicals properly. Storage of chemicals 100 meters away from any water sources.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.3 Generation of Solid Waste

Solid waste will be generated from the construction camps and offices, which include food waste, paper and plastic, and garbage. About 300 workers live in the construction camp and the average solid waste generation per worker is 0.5kg per day. Thus, the total quantity of waste generated from the camps will be 100 kg per day. Most of these wastes will be food waste. If these wastes are not properly managed, they may harm the environment and health of workers and nearby communities.

Mitigation

The following mitigation measures will be implemented by the contractor:

- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan and submit it to the PMU for their review and approval.
- Collection and segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Three kinds of waste bins (with different colors) with adequate numbers and capacities will be placed at the campsite (kitchen, offices, rooms) for the segregation of the waste at source.
- Organic waste will be treated through onsite composting
- Procure the services of waste management contractors for the collection and management of recyclable waste. Recyclable waste will be compressed through bailers to minimize the volume of waste to be stored and transported.
- Local municipal waste disposal sites will be used for the disposal of garbage. No disposal sites will be established by the contractor.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.4 Wastewater Discharges from Construction Sites

The potential sources of waste water generation in the construction sites are batching plants, crusher plants, construction yards and workers camps. The wastewater discharges from the batching plants contain high sediment loads and high pH value. The wastewater used in the crushing plants also generate high sediment yield. These discharges will impact the soil and groundwater quality and aquatic environment if they are discharged into rivers and streams without any prior treatment. The groundwater located within the river bed would be affected by the wastewater discharges. Other wastewater discharges from the construction sites include sanitary effluents from workers camp, and vehicle and machinery washing facilities.

Mitigation

The following mitigation measures will be implemented:

- Sedimentation ponds, of adequate size and capacity, will be built for the treatment of discharges from the batching plants and the crushing plants to allow the sediments to settle. Final discharges from the sedimentation ponds shall comply with World Bank EHS standards for wastewater standards. The settled sediments will be periodically removed and will be disposed of at the designated spoil disposal sites.
- Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and site drainage)
- The contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the water
- Quarterly monitoring of wastewater quality to ensure compliance with the standards.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.5 Risk of Soil and water pollution from Construction Works

During construction, there is a high risk of accidental spills and leakages from fuel and oil tanks, vehicles, machinery and stored chemicals that are used in construction areas, yards, batching plants, worker camps, and storage sites. Earthworks for site preparation and foundation during rainy periods may carry the sediment load to the nearby water bodies. Other potential sources of soil and, surface water and groundwater pollution are improper storage and handling of materials, including hazardous materials, discharges from the construction sites and material storages, lack of proper drainage facilities, spillage of fuels, erosion from material stockpiles, etc.

Mitigation

The following mitigation measures will be carried out by the contractor to minimize soil and water pollution.

- Storage of fuels and chemicals in contained facilities and take appropriate measures to avoid and contain any spillage
- confine the contaminants immediately after such accidental spillage and cleanup of oil spills using spill kits.
- Collect contaminated soils, treat and dispose of them as a hazardous waste
- Topsoil from cultivated lands in the construction areas to be stripped and stockpiled where practical for later use for restoration of spoil disposal sites.
- Temporary stockpiles to be protected from erosion.

- Contractor will develop pollution prevention and emergency response plan as part of C-ESMP and submit for PMU approval. The plan will details procedures to minimize and address risk of soil and water pollution.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.6 Air and Noise Pollution from Construction

During construction, air and noise emissions from the construction activities will cause temporary nuisances to the residents along the Project road. Due to ribbon development along the project road, many residences and businesses are located adjacent to the road and will be subjected to air and noise pollution from construction activities. Major sources of air and noise pollution are earth works, emissions from construction-related traffic and equipment. The construction activities will also generate airborne dust and particulate matter. The dust raised from the above activities will have impacts on crops, animals and public health.

Mitigation

The following mitigation measures will be implemented;

- Construction equipment and vehicles will be well maintained so that emissions are minimal and comply with emission standards of Nepal Vehicle Emission Standards 2012.
- Crushing and batching and asphalt plants will be located a minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers
- Dust generation from construction sites would be restricted as much as possible, and water sprinkling would be carried out throughout the construction period.
- Construction activities near the settlements will be limited to daytime only
- High noise-producing equipment will be provided with mufflers or acoustic enclosures.
- A GRM will be put in place to receive complaints from the public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting the necessary measures.
- Quarterly air and noise quality monitoring will be carried out in the project area to ensure compliance with national on ambient air and noise quality.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.7 Impacts from Quarry and Borrow Activities

About 2.2 million m³ of aggregates and 1.17 million cubic meters of fill (borrow) material will be required for construction activities. Improper siting and extraction of these construction materials will have significant impacts on the physical and biological environment on the quarry and borrow areas.

Mitigation Measures

The following mitigation measures will be implemented:

- The contractor will develop quarry and borrow areas procurement and management plan submit it for approval of PMU.
- The contractor shall use the government-approved quarry sites for the procurement of aggregates.
- Reuse of excavated material from the construction sites to the extent feasible.
- Source the material from the dry river beds and the non-perennial streams.

- Although the material is widely available, the quarrying/mining activities will be limited to fewer areas to reduce the area of extent affected by quarrying activities. If any mining activities are to be carried outside the project area, they should be not be located in any sensitive areas.
- Maintain a buffer zone of 5 to 10m between the low flow channel and the mining operations to minimize the downstream impacts and limit the excavation activities to the low flow season (non-monsoon).
- Borrow sites will be restored after completion of the works

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.8 Impact on River Habitat due to Instream Construction Activities

Construction activities in the river, for bridges and bank protection works have the potential to adversely affect aquatic biota by the release of high concentrations of sediment during the construction of cofferdams, erosion/run off from river bank and accidental spillage of fuels. Quarrying activities for procurement of material from rivers also generate high sediment load impacting the water quality. Potential quarry sites in the project area that can be used during construction are Banganga River, Tinau River, Dano River, and Kanchan River. Government approved existing quarry sites are located near these rivers.

Mitigation

The following mitigation measures will be implemented:

- Contractor will use the existing quarry sites operated with the government licenses.
- No new sites will be established by the contractor. If any new sites to be developed, contractor will develop quarry and borrow pit operation plan and obtained approval from supervision engineers prior to operation of quarry.
- Avoid haphazard quarry along the riverbank and hills. Permanent barricade at quarry location for safety, established safety signage boards, and installed noise barrier.
- Control of wastewater and sediment releases to river
- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into the River.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil and lubricants, and grease.
- Machinery leaking fuel, lubricants, hydraulic fluids, or solvents shall not work within the river.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use.
- Restoration of the borrow sites after completion of the works

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.9 Impact on Flora

The potential impacts on flora during construction include cutting of the trees by worker for fuel, and clearing of vegetation for establishing the temporary construction facilities such as workers camps, material storage sites and other facilities.

Mitigation

The following mitigation measures will be implemented:

- The contractor's code of conduct for workers will include conditions on the protection of flora and fauna and ban on cutting of trees and ban on hunting and poaching of wildlife. Employees found violating would be subject to strict actions including fines and termination of employment.
- Use of non-wood fuel for cooking and heating.
- No temporary construction facilities will be established in the forest areas
- Awareness-raising to workers on the protection of flora and fauna
- For road widening, the dense vegetation will only be cleared once it has been established that any individuals present have fled. Before and during vegetation clearance or tree felling, any animals found will be removed and released to a safe place. There should be no burning of natural vegetation. The borrowed animals, if found during excavation, shall also be transported to a safe place.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.5.10 Impact on Fauna

Impact on Mammals. The tree clearance within RoW in the forest blocks without well-planned compensatory plantation would degrade wildlife habitat. If the existing barbed wire fence in the Saljhandi-Pipara forest block were damaged/removed, this would increase the wildlife roadkill and/or human-wildlife conflict. The construction workers living in the camps are likely to use fuel wood for cooking and also, to some extent, in the winter season for heating purposes. Wildlife poaching would be possible without proper awareness-raising. Accidental spillage of oil and lubricant from construction equipment/vehicle and waste dumping in the forest areas, particularly from camp sites, would cause negative impacts on wildlife.

Impact on Birds. Construction phase will have limited impacts on the avifauna. Tree clearance within RoW will slightly reduce bird habitat, foraging and roosting trees. Increased people mobility and noise during construction might disturb the bird species and affect their behaviors. Dumping of wastes/chemicals and accidental spillage in springs, rivers and wetlands could affect the bird habitat at site specific level.

Mitigation

Following mitigation measures will be implemented to address the impacts on mammals:

- No workers camps and construction facilities should be constructed in the forest areas
- Rehabilitation of existing barbed wire fence in Saljhandi-Pipara forest considering wildlife protection
- Installation of a fence in Gorusinghe forest block considering wildlife conservation and effectiveness
- Culvert/tunnel installation in the forest blocks based on the additional study on mammal movement/roadkill
- Installation of traffic signs alerting speed limit
- Installation of wildlife crossing information/display board at 1km span and speed breakers in the forest blocks
- Compensatory plantation (mainly, identification of location, preparation of nursery)
- Awareness-raising workshops with the forest user groups at the forest blocks regarding wildlife behaviors, road kills, wildlife poaching, human-wildlife conflict and traffic regulations

- Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution
- Inclusion of wildlife protection clauses in the code of conduct for contractors
- Construction site should be fenced to prevent the wildlife entry to the construction site
- Regular visual inspection of wildlife will be conducted by ecologist appointed in the contractors.
- Spill kits should be provided at each construction site where oils and chemicals are used.
- Regular maintenance of construction equipment and vehicle will be undertaken
- Oils and chemicals should be stored at designated storage with proposed spill/accident prevention and response measures such as the provision of secondary containment, MSDS and spill kit
- The organic waste should be properly stored and composted.

Following mitigation measures will be implemented to address the impacts on avifauna and snakes:

- The construction materials and their by-products should be stored away from watercourses. Especially, during summer/monsoon time, good care should be taken.
- No construction activities during the night time
- Large sapling plantation at road side should be carried as soon as the construction work completed. This will increase bird habitat, foraging and roosting trees specially in semi urban and rural area
- Road side plantation be made of the species which bear seed/fruit and have open/light canopy like simal (*Bombax ceiba*), etc.
- Ensure use of machines those produced low noise where feasible.
- Unnecessary noise generation during the construction work and post construction should be avoided through regular awareness and traffic no-horn zones.
- Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution
- Inclusion of wildlife protection clauses in the code of conduct for contractors

5.6 Occupational Health and Safety Risks during Construction

5.6.1 Occupational Safety Risks in Construction

Some of the Occupational Health and Safety risks which are likely to arise during the construction phase are typical to many large construction sites, which include: exposure to physical hazards from use of heavy equipment including cranes; working at height and electrical equipment; working on water, trip and fall hazards; exposure to dust, noise and vibrations; falling objects; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Mitigation

The following mitigation measures will be implemented:

- The contractor will be required to prepare, obtain approval of, and implement an occupational health and safety (OHS) plan. These plans will be prepared in compliance with the World Bank

Group's EHSs and national regulations. If these guidelines cannot address any specific aspect of OHS, international good practices such as OSHA and ILO will be applied. OHS Plan should contain general guidance for all identified hazards under each work activities, and site-specific OHS hazard and risks during construction, and control and preventive Measures proposed by the Contractor. The Plan shall be reviewed and updated if there any changes in the construction methodologies.

- OHS Plan should contain general guidance for all identified hazards under each work activities and they should be presented in three discrete headings, (a) Contractor's Standards on the identified hazard management, (b) Expected Site-specific OHS hazard and risks during construction, and (c) Control and Preventive Measures proposed by the Contractor.
- The OHS plan will be reviewed and approved the Construction Supervision Consultant and the World Bank
- Conduct a 'job hazard analysis' at the new construction site to identify potential hazards that may arise from the proposed works or working conditions to the project workers and implement necessary control measures. The job hazard analysis should be part of the contractor's method statements, which will be reviewed and approved by the supervision consultants. The specialists of the supervision consultant will also visit the construction sites, prior to the start of construction, to ensure the control measures are in place.
- Regular site inspections and safety audits by the construction supervision team, both by the OHS specialist and the site engineers. Since the site engineers will present at the worksites all the time, they will be trained by their OHS team on monitoring safety aspects of the construction works.
- Regular training program for workers on occupational health safety (monthly training and daily toolbox talks). Special attention will be focused on safety training for workers to prevent and restrict accidents and on the knowledge of how to deal with emergencies.
- Incident investigation and reporting, including a complete record of accidents and near misses, will be maintained.
- In order to protect all project personnel and visitors, the Contractor will provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, body harness, protective clothing, goggles, fully face eye shields and ear protection. The contractor will also provide training to workers on how to use them and maintain in a sanitary and reliable condition and replace the damaged ones immediately with the new one.
- Availability of firefighting, ambulance, medical and rescue facilities at the site for implementation of an emergency response plan
- Adequate water supply and mobile toilets, medical and first aid care facilities at the worksites
- Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan
- Awareness-raising material will be used including posters, signage, booklets, and others at the worksites
- A complete record of accidents and near misses will be maintained.
- First aid facilities will be made available at the worksites and in the camps. The contractors will engage qualified first aider(s).

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.6.2 Occupational Health Risks in Construction

Potential health issues on workers are associated with the use of temporary accommodation sites include those relating to sanitation, disease, fire, cultural alienation, sleeping space, quality and quantity of food, personal safety and security, temperature control and recreation, amongst others.

Mitigation

The following mitigation measures will be implemented:

- The contractor will develop and implement a camp management plan
- The construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, etc.) including entertainment facilities so that there will be minimal interaction between them and local communities
- Separate facilities will be provided to men and women workers
- The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7 Social Impacts and Risks during Construction

5.7.1 Safety Hazards due to Increased Traffic

The road widening activities will affect the normal traffic on the highway and local traffic, and could lead to traffic congestion. The construction activities can potentially impact the residents of settlements along project Road, particularly the movement and safety of school children and elders. Due to increased use of trucks and other vehicles on the narrow roads in the project area, pedestrians, particularly elderly people and children will be more exposed to dangerous situations, which may lead to traffic accidents.

Mitigation

- The contractor will develop and implement a traffic management plan with adequate measures such as proposing traffic diversion measures, alternate routes for local traffic, avoiding school hours, following speed limits, hiring licensed drivers, etc.). The plan will be implemented with the aim of ensuring access to residential areas and preventing unsafe situations, especially near schools, housing areas, construction areas
- The road should not be stopped for existing traffic. The contractor will maintain the traffic on both sides of the highway by placing appropriate control measures and flagmen.
- Road signage will be fixed at appropriate locations to reduce safety hazards associated with project-related vehicular traffic.
- Liaison with traffic police will be maintained
- Project drivers will be trained in defensive driving.
- Ensure that all construction vehicles observe speed limits on the construction sites and on public roads
- Provide adequate signage, barriers, and flag persons for traffic control.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.2 Community Exposure to Work Hazards, communicable diseases

Communities will be exposed to construction-related hazards due to excavation, heavy vehicular movements. These risks will be more at the construction works located close to the existing settlement (near 19 major villages and bazars)

Mitigation

The following mitigation measures will be implemented:

- Barricade the work areas with hard fencing to prevent the entry of community in the construction areas.

- Placing of adequate signboards and flagmen to divert the community away from the construction works.
- Implementation of traffic management plan near the construction sites
- Community awareness programs on construction-related hazards, including awareness programs in schools Construction activities such as blasting and excavation, particularly at the borrow areas, may pose safety risks to the nearby population.
- First aid medical facilities will be made available at the worksite.
- Campaigns on STIs and communicable diseases (e.g. HIV/AIDs, COVID-19)

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.3 Dust from Construction Activities

The construction activities, particularly earthworks will generate airborne dust and particulate matter. In addition, vehicular movement along the local roads, for transport of quarry and borrow material, will also generate a lot of road dust. The dust raised from the above activities will have impacts on crops, animals and public health. The generation of dust will be a major issue in the construction.

Mitigation

Following measures will be implemented

- Dust generation from construction sites will be restricted as much as possible and water sprinkling will be carried out as appropriate, especially at those places where earthmoving, excavation will be carried out.
- Frequent sprinkling of water on the local roads and worksites to control dust emissions. The contractor has to mobilize adequate water sprinkling trucks.
- A GRM will be put in place to receive and address complaints from the public on various aspects of environmental issues, including dust pollution.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.4 Employment Opportunities in Construction Activities

About 300 skilled and 200 unskilled workers will be required during construction on a continuous basis for about five years. During the peak construction period, the requirement of unskilled labour will be about 500. The project offers good opportunities for local residents to apply for employment as unskilled and skilled construction workers. The local communities during the stakeholder consultations have shown great interest to work in the construction activities. The contractor will be recommended to employ local workers and technicians to the extent possible. In addition to maintaining good relations with the local communities, maximizing local employment may also be cost-effective since engaging the workforce from other parts of the Country could be costlier. All these new opportunities for work for local residents could boost employment and improve the social and economic position of the population for a short time. This will be a major and significant positive impact of the project.

Mitigation

The contractors will be required to formulate a labour management policy to ensure equitable availability of employment opportunities to all communities within the project area, particularly the project affected persons.

The contractor will adopt the following Labor-Management Guidelines while preparing the labour management policy:

- encourage to engage local workers/laborers with the same terms and condition of outside workers/laborers;
- integrating provisions to redress labour related grievances in the Grievance Redress Mechanism (GRM) which should be well known to the laborers/workers and accessible;
- prohibition of child labor;
- no engagement of forced and bonded labor;
- provision of a safe and healthy working environment to workers; and
- taking steps to prevent accidents, injury, and disease and appropriate treatment for those suffering from occupational injuries/diseases; and encourage for insurance facility for workers.

5.7.5 Impacts from Labour Influx

For the proposed project activities, the average labour requirement per day is 500. Unskilled workers will be hired locally; however, the skilled works will be brought by the contractor from other parts of Nepal or abroad. It is estimated that about 200 migrant workers work in this project. labor influx may lead to negative impacts on the host community. Pre-existing social issues in the host community can easily be worsened by the influx of labor. The potential risks associated with labour influx are social tension arise between the local community and the construction workers, which may be related to differences due to competition for local resources, increase the rate of crimes and/or a perception of insecurity by the local community, increased burden on and competition for public service provision, and influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), infectious diseases such as COVID19, or the incoming workers may be exposed to diseases to which they have low resistance. The presence of workers in local communities can also result in intimate relations as well as sexual exploitation and harassment.

Mitigation

The following mitigation measures will be implemented:

- This situation will be addressed by an awareness campaign implemented at the beginning of the construction phase. The Contractors will be aware of the possibility and risks of miscommunications between local residents and workers, which easily could lead to conflicts. This will be prevented by raising awareness and implementing a Code of Conduct for the workers. The Contractor shall develop a Worker Code of Conduct to govern the behavior of workers on-site, in camps, and in local communities.
- The awareness campaign will also be aimed at the risk of interaction between the resident population and the construction workforce, including the spreading of sexually transmitted diseases such as HIV/AIDS.
- The contractor will prepare a labour management plan prior to construction works for approval of PMU.
- The contractor's code of conduct shall cover the program to promote awareness to the construction workers on respecting the local community.
- Construction camps will be built in the designated areas, located away from the local settlements
- The contractor will ensure local water usage will not be affected by the project water usage by the project or compete with water requirements of the local community
- The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community
- COVID-19 protocol measures, specified in the World Bank guidelines, will be complied.

With the above mitigation measures, the residual impacts have been assessed as minimal.

5.7.6 Risk of Gender-Based Violence

The interaction between the Project construction labor force and the communities, and especially on the women workers, may lead to Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH)

Proactive/Preventive Measures

Commensurate with this risk level and also to be proactive, the Project has proposed several proactive measures. SEA/SH Action Plan will be designed and implemented and will include the following measures:

- Inclusion of clause on GBV/SEA/SH behavior obligations in the employment contracts of all employees and construction workers aimed at strengthening measures to address and prevent SEA/SH in the workplace and construction areas.
- Awareness training of DRO, CSC, contractor, sub-contractor and service providers staff to sensitize them about SEA, and SH, and their responsibilities to prevent
- Posting of CoC standards in public spaces at contractor's work camps and living areas, and village information centers and public places of adjoining/neighborhood communities in the Nepali language
- Raising awareness that SEA/SH is prohibited
- Awareness to explain suspicious situations and the signs of SEA/SH;
- Provide information on the use of GRM to report cases of SEA/SH, Code of Conduct breaches and assist victims of SEA, if signs of SEA are identified/a victim approaches them to complain about SEA;
- Awareness to communities, particularly women, and male and female children to understand risks of SEA and SH and the roles and responsibilities of parties involved in project implementation on SEA and SH prevention, processes for reporting incidents of project-related SEA/SH, and the corresponding accountability structures.
- Strengthen the Contractors' obligations and capacity to public health and safety risks and ensure contractor supervision capacity to monitor the mitigation of these risks.
- Proactive GBV/SEA prevention measures will be put in place, such as GBV/SEA related training to sensitize workers and local population along the project implementation area and ensuring that GRM for the project will also take care of GBV related issues if any.
- There will be adequate mechanisms in place to protect the local vulnerable population, especially women and minors from risks associated with the influx of workers (harassment, underage sex). This mechanism will ensure the sensitization and enforcement of code-of-conduct by the Contractor employees and workers and all other parties that are involved in the project implementation.
- Additionally, the Contractor will employ their skilled staff and apply unskilled construction labor from the local population as far as possible to minimize an influx of outsiders into the communities.

5.8 Environmental and Social impacts during Operational stage

5.8.1 Workers Health and Safety during O&M

The potential OHS risks associated with the O&M stage mainly result from the routine maintenance works and they include (i) exposure to higher levels live traffic because of working in proximity to live traffic, and (ii) exposure to high noise levels from the traffic.

Mitigation

The following mitigation measures will be implemented

- Establishment of work zones to separate workers on foot from traffic and equipment by:
 - Routing of traffic to alternative roads when possible
 - Closure of lanes and diversion of traffic to the remaining lanes if the road is wide enough (e.g. rerouting of all traffic to one side of a multi-lane highway)
 - Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield worker from traffic vehicles, or installation of channeling devices (e.g. traffic cones and barrels) to delineate the work zone
 - Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible
 - Design of the work space to eliminate or decrease blind spots
- Reduction of maximum vehicle speeds in work zones;
- Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).

5.8.2 Community Health and safety during O&M

The potential risks to the community, during routine maintenance works will be, among others, dust, noise, and vibration from construction vehicle transit, and communicable disease associated with the influx of temporary construction labor. Significant community health and safety issues associated with road projects may also include pedestrian safety and traffic safety. Pedestrians and bicyclists are at greatest risk of serious injury from collisions with moving vehicles. Children are generally the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behavior while at play, and their small size making them less visible to motorist. Collisions and accidents can involve a single or multiple vehicles, pedestrians or bicyclists, and animals. Many factors contribute to traffic accidents. Some are associated with the behavior of the driver or the quality of the vehicle, while others are linked to the road design, or construction and maintenance issues.

Mitigation

The following mitigation measures will be implemented

- Provision of safe corridors along the road alignment and construction areas, including and bridges (e.g. paths separated from the roadway), and safe crossings (preferably over or under the roadway) for pedestrians and bicyclists during operation. Crossing locations should take into account community preferences, including those related to convenience or personal safety (e.g. the prevalence of crime at potential crossing point locations).
- Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points;
 - Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas;
 - Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;
 - Setting of speed limits appropriate to the road and traffic conditions

- Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross; construction of animal crossing structures; installation of fencing along the roadway to direct animals toward crossing structures; and use of reflectors along the roadside to deter animal crossings at night when vehicles are approaching)
- Implementation of No Blowing of Horn Zones particularly in settlement areas
- Installation of Signages
- Monitoring noise level maintained at national standard
- The detailed design of BG road improvements integrates the findings and recommendations of the road safety audits undertaken in multiple stages
- Road safety will also be undertaken post completion works
- Road safety awareness
- Speed control and regulations (especially in populated areas, near schools and other public places).
- Road crossing infrastructures incorporating principal of universal access.
- Speed control mechanisms at place such as zebra cross, speed breakers, speed limits at crowded places etc.
- Establishment of traffic signals, GPS tracking and CC cameras for speed control for public buses plying the highway.
- Vehicle maintenance and inspection. Control loud horns to avoid sound pollution.
- Training of first-aid services in the case of accident.
- Manage temporary bypass while constructing the road.
- Road safety awareness trainings to general public.
- Capacity enhancement for traffic police and locals.

5.8.3 Impact on Flora and Fauna

There will be no impact on the flora during maintenance works. The proposed compensatory plantations and tree plantation along the medians need to be maintained with adequate watering and maintenance. The fences established in the forest areas and culverts proposed for the reptile movement should be maintained regularly to ensure their proper use. The improved vehicle speeds due to improved road conditions may lead to road kills. The increased mobility of traffic in the wide road is likely to generate higher noise and speed. Birds when flying at the low to ground level could be collided with the traffic but this is considered as occasional incident based on the past experiences and studies.

Mitigation

Following mitigation measures will be implemented

- Recording the road kill at three forest blocks in coordination with divisional forest offices
- Monitoring the use of culvert by wildlife species, especially snakes and other reptiles
- Assessment of need of additional culvert/wildlife crossing structures along the road based on the monitoring result
- Compensatory plantation (including monitoring and maintenance of saplings)
- Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking
- Regular inspection and maintenance of fencing installed/maintained in the forest areas

- Installation of signboard to raise awareness to reduce waste dumping from vehicles in the forest blocks.
- Holding workshops for awareness-raising on wildlife protection such as prevention of waste dumping from vehicles, speed limit, potential collision with animals.
- Continuous monitoring of herpetofauna species movement/crossing and road kill in the forest area
- Introduction of no-horn zone in the forest blocks
- Installation of traffic signs alerting speed limit
- Installation of wildlife crossing information/display board at 1km span and traffic calming measures in the forest blocks

5.9 Cumulative Impacts

Nepal is a landlocked and mountainous country, and depends heavily on road transport for moving commercially traded goods. The Government of Nepal (GoN) recognizes road infrastructure development as pivotal to economic development. An improved road network is key for fostering regional trade and the economic development of Nepal.

The Butwal-Gorusinghe Road, which is a part of the East West Highway (EWH), extends from the eastern to the western boarder of Nepal, is the main trade and physical mobility corridor that connects Nepal to India and Bangladesh. The overall accessibility and economic activities of Nepal are determined by this highway. The total length of the highway, which was constructed 50 years ago, is approximately 1,028 km with a single lane bituminous carriageway. It has been rehabilitated and upgraded to a double lane highway during the period 1998-2005. The existing condition of the highway is poor and the majority of the bridges (most of which are more than 40 years old) require replacement. With an increase in the country's population, there has been an associated increase in the number of vehicles and frequency of travel. Therefore the Department of Roads (DoR) is proposing to upgrade the EWH into a four-lane standard road in a phased manner with funding support locally and from other International Financing Institutions such as the World Bank, the Asian Development Bank, and the Japan Bank for International Cooperation.

Cumulative Developments on the East-West Highway

The World Bank is thus supporting the Government of Nepal to address infrastructure and non-infrastructure constraints to improved regional trade under the ongoing Nepal-India Regional Trade and Transport Project (NIRTTP) and the Strategic Road Connectivity and Trade Improvement Project (SRCTIP). Under the NIRTTP, the improvement of the 2-lane 33-km Narayanghat-Mugling (i.e., N-M) road was supported while SRCTIP will support the improvement of the 2-lane 94.7-km Nagdhunga – Naubise – Mugling (NNM) Road on the pivotal north-south (N-S) trade corridor connecting Kathmandu and Birgunj (both NM and NNM Roads do not involve any widening or upgrading to 4-lane) and the widening of the 130-km Kamala – Dhalkebar – Pathlaiya Road (KDP) of the East West Highway into a four-lane road.

Other improvements of other sections of the East West Highway are either ongoing, or will commence soon with funding from the Asian Development Bank under the South Asia Sub-Regional Economic Cooperation (SASEC) Highway Enhancement Project:

- Kanchanpur-Kamala, 87 Km (ADB - Expected completion: December 2023)
- Narayanghat- Butwal, 115 Km (ADB - Expected completion: January 2022)
- Nagdhunga Tunnel on NNM road, 5.05 Km (JICA - Expected completion: December 2022)
- Mugling-Pokhara Road, 81 Km (ADB - Expected completion: December 2025)

Environmental Sensitivity of the East-West Highway

The East West Highway and North South Road network traverse environmentally and socially sensitive areas, wetlands, and different types of forests that harbor important biodiversity resources and species of global and national significance, such as important bat roosting areas, etc. Between Pathlaiya and Narayanghat, the road passes through several protected areas, including the Chitwan National Park (a UNESCO World Heritage Site), Parsa Wildlife Reserve, and Bharandabaha Forest, as well as other areas of natural forest habitat not currently under formal protection. While data on wildlife movement is limited, existing information and anecdotal evidence indicates that the road crosses multiple active wildlife corridors for elephants, rhinos and other species. In particular, the approximately 10km stretch from Pathlaiya to Ahmaleckganj (between Birgunj and Hetauda, in the buffer zone to the Parsa Wildlife Reserve) is a critical area for biodiversity and reportedly part of a wildlife corridor for elephants and rhinos that migrate seasonally from the Reserve to the Bagmati River. There are regularly reported road crossings as well as traffic-related wildlife fatalities along this stretch involving these and other important species such as tigers, leopards and wild boar. The approximately 4.5 km Tikauli Forest stretch through Bharandabaha Forest -- which links Chitwan National park with forest to the north of the road in the Mahabharat hills -- is another reported hotspot for wildlife migration and movement. Tigers and rhinos reportedly cross here, mostly in late summer. On the other hand, while the Fast Track and Tunnel Road alignments would both divert traffic away from at least some of the protected areas and known sensitive zones for wildlife movement, all identified alignments would still cross through some portion of an important elephant and rhino migratory corridor that extends from the Parsa Wildlife Reserve eastward towards the Bagmati River.

Valued Environmental Components (VECs)

VECs	Relevance
Forest cover	Total forest area lost (directly or from induced land use change) Reduction in measurable associated forest-based ecosystem services (such as slope stability / erosion control, provision of non-timber forest products to local communities, etc.)
Geomorphology and landscape	Number of landslide events Total area affected by soil erosion/landslides and slope instability Kilometers of road affected by landslides/slope instability, and number of days (or time) roads are obstructed (no traffic movement)
Water and watershed condition	Surface water and ground water condition Changes in streamflow Increase or reduction in irrigated area Increase or reduction in consumptive water use
Human Health	Traffic related fatalities, number of wildlife collisions, damage costs
Land and Property	Value of assets lost including agriculture land and structures (residential and commercial) that may be affected Number of people affected by the loss of assets

Cumulative Impacts

Development of all these projects will have a significant cumulative impacts on the identified VECs. The World Bank has initiated a Strategic Environmental and Social Assessment (SESA) study to support the Government of Nepal (GoN) in enhancing the overall performance of selected critical roads sections of the East West Highway, and the capacity of the DOR for better planning, management and improved transport efficiency of the country's Strategic Road Network. The study is expected to be completed by November 2022. The detailed objectives of this study are:

- To provide a basis for DoR to factor in priority environmental and social considerations and key stakeholder perspectives into upstream strategic decision making about the improvements/upgrading of the East West Highway (KDP) and North South (NNM) -- alongside financial, technical and social considerations;
- To assess the cumulative impacts of proposed highway projects together with other past, ongoing and planned development interventions within the KDP Road section of the East West Highway and the NNM Road within the North South Road Network identified and prioritized Valued Environmental and Social Components (VECs);
- To contribute towards embedding good practices on greening the road sector, biodiversity conservation and protection, building resilience and overall environmental and social management into road sector development in Nepal generally, as well as specifically into the updated feasibility studies, ESIAs, engineering designs and implementation of selected specific corridor investments along East West Highway and North South Road Network. All of these will be embodied in a Strategy/Road Map for Greening the Selected Corridor of the East West Highway and North South Road Network.

6 Environmental and Social Management Plan

This chapter describes the proposed institutional mechanism, mitigation and monitoring plans for management of environmental, social, safety and health issues of the Project, and inclusion of mitigation and monitoring measures in contractors bidding documents

6.1 Objectives of ESMP

The basic objective of the ESMP is to manage the adverse impacts of project interventions in a way, which minimizes the adverse impact on the environment and people of the project area. The specific objectives of the ESMP are to:

- Facilitate the implementation of the mitigation measures identified during the present ESIA and discussed earlier in the document;
- Draw responsibilities for DOR, contractors, consultants, and other members of the Project Team for the environmental and social management of the Project;
- Define a monitoring mechanism and identify monitoring parameters in order to:
 - Ensure the complete implementation of all mitigation measures,
 - Ensure the effectiveness of the mitigation measures;
- Implement environmental training programs for the implementation staff.

6.2 Inclusion of ESMP in contract documents

In order to make the Contractors fully aware of the implications of the ESMP and responsible for ensuring compliance, technical specifications in the tender documents will include compliance with mitigation measures proposed in ESMP. The Contractor will be made accountable through contract documents for the obligations regarding the environmental and social components of the project.

PMU will include the following Environmental, Social, Health and Safety (ESHS) Conditions in the bidding documents:

- Past performance of the Contractor on ESHS aspects including sexual exploitation and abuse and gender-based violence;
- ESHS Staff with the Contractor;
- Performance Security;
- Mitigation measures to address construction impacts;
- Payments for implementation of ESHS measures;
- Code of conduct of Contractor's Personnel;
- Management Strategies and Implementation Plans (MSIP) to manage the ESHS Risks.

Each of the above conditions is elaborated in **Table 7.1**.

Table 6.1: ESHS Conditions in the Bidding Documents

(DOR include this table in the bidding documents)

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PMU
1. Past performance of the Contractor on ESHS is one of the eligibility criteria for	The Contractor's past performance on compliance with ESHS is an indicator of the Contractor's commitment and capability for	The Bidder shall "declare any civil work contracts that have been suspended or terminated and/or performance security called by an employer for reasons related to the non-compliance of any	Bidder to make the Declaration	PMU use this information to seek further information or clarifications in

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PMU
the shortlisting process	implementation of the ESMP	environmental, or social (including sexual exploitation and abuse (SEA) and gender-based violence (GBV) or health or safety requirements or safeguard in the past five years".		carrying out its due diligence
2. Contractor shall propose adequate ESHS Specialists in his team (Environmental Specialist, OHS specialist, Social specialist, site supervisors)	The Contractor's staff should include adequate ESHS specialists who are responsible for the implementation of all mitigation measures on ESHS risks and compliance with ESMP	The Bidder shall propose an Environmental, Social, Health and Safety (ESHS) Specialist as the Contractor's Key Personnel at the Site. The Bidder shall provide details of the proposed ESHS specialist including academic qualifications and work experience. The ESHS Specialist should have a minimum bachelor's degree in engineering or a master's degree in sciences related to environmental management. The Specialist should have 5 years of experience working on monitoring and managing ESHS risks related in infrastructure projects.	The bidder to submit the CV of proposed ESHS Specialist	PMU will review and approve
3. Contractor shall submit ESHS Performance Security for compliance with ESHS obligations	The Contractor should have a financial implication if he could not comply with ESHS requirements. Hence performance security will be collected from the Contractor	The Bidder shall submit the ESHS Performance Security in the form of a "demand guarantee" in the amount of three percent (1-3%) of the Contract Amount.	The bidder will submit a Performance Security	
4. Implement Mitigation Measures to Address Construction-Related Impacts given in ESMP	The mitigation measures to address potential ESHS risks and impacts should be included in the bidding documents. The Contractor shall be made responsible for the implementation of the mitigation measures through the necessary conditions in the contract.	PMUs will ensure the ESMP in the General Specifications of the Bidding Document, and the reference to this document will be provided in the Conditions of the Contract as follows: - The Contractor shall implement the mitigation and monitoring measures given in the ESMP to address ESHS risks associated with the construction works. The Consultant shall refer to the ESIA of the Project, which is available on the PCMU website for further guidance. - The Contractor shall comply with the World Bank Group's General Environmental Health and Safety		PMU will include this condition in the bidding document

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PMU
		Guidelines, and applicable sector specific guidelines		
5. Payments for implementation of ESHS Mitigation and Monitoring Measures	BOQs on ESHS implementation are included in the Bidding Documents	A lumpsum budget will be allotted for the preparation and implementation of C-ESMP (including OHS plans), environmental monitoring, etc.	Bidder will quote for the ESHS Management	
6. Code of Conduct for Contractor's Personnel	All workers hired by the Contractor should sign a code of conduct to ensure compliance with ESHS obligations of the Contract	The Bidder shall submit the Code of Conduct that will apply to the Contractor's employees and subcontractors. The Code of Conduct will state that the workers will comply with the following ESHS requirements: • Wearing of Personal Protective Equipment (PPE's) in the workplace at all times • Non-discrimination in dealing with the local community by race, ethnicity, gender, religion, disability, sexual orientation, gender identity, social, or health status • Respectful attitude while interacting with the local community • Prohibit sexual harassment particularly towards women and children • Prohibit violence, including sexual and/ or gender-based violence • Respecting the reasonable work instructions • Protection and Proposer use of the property The suitability of the Code of Conduct can be assessed and discussed as part of the Bid/Proposal evaluation and negotiations The successful bidder is required to implement the agreed code of conduct upon contract award	Bidder shall submit code of Conduct with the bid documents	
7. Contractor's Management Strategies and Implementation Plans (MSIP) to manage the ESHS Risk	The Contractor proposal should include his understanding of the ESHS requirements of the project and the proposed strategies to manage the ESHS risks	The Bidder shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key ESHS risks: • Strategy for the protection of workers and community from the construction-	The bidder will submit MSIP along with the Bid Documents	

Condition	The rationale for the inclusion of this Condition in the Contract	Specifications to be included in the Bidding Documents	Responsibility	
			Bidders	PMU
		related hazards inside the terminal • Borrow area management and restoration plan • Construction Material Sourcing Plan • Pollution prevention (wastewater, air and noise emissions) and management • A waste management plan for proper collection and disposal of waste • Traffic management plan to ensure the safety of local communities from construction traffic • Hazardous material management plan safe storage and handling • Strategy to address labor influx impacts on the local communities • Gender-based violence and sexual exploitation and abuse prevention and response action plan • Emergency response plan and early warning system The Contractor shall be subsequently required to submit (before mobilization) the Contractor's Environment and Social Management Plan (C-ESMP) by the above strategies and Condition 4 of this Table.		

6.3 Environmental and Social Management During Construction

6.3.1 Pre-construction Stage Mitigation Plans

Pre-construction stage will mainly include the mobilization of the contractor and finalization of the following conditions/documentation by the Contractor:

- Contractor's Environmental and Social Management Plan (C-ESMP) with site-specific management plans;
- Labour Management Procedures to be followed for hiring and management of labour;
- The mobilization of ESHS Specialists

Each of the above conditions is elaborated in **Table 6.2**.

Table 6.2: ESHS Conditions in the Pre-Construction Stage

Condition	The rationale for the inclusion of this Condition	Description of the Condition	Responsibility	
			Implementation	Supervision
1. Preparation of Contractor's Environmental and Social Management Plan (C-ESMP)	The Contractor shall submit site-specific management plans to address ESHS risks following the ESMP requirements and MSIP proposed in the bid documents.	The Contractor to submit for approval and subsequently implement their Environment and Social Management Plan (C-ESMP). The C-ESMP should be submitted prior to the commencement of construction works, and no construction activities will be carried out under the project until approval of the C-ESMP. The C-ESMP will include the following <u>site-specific</u> management plans on: • Occupational health and safety management plan • Community health and safety management plan • Camp management plan • Waste management plan • Wastewater discharges management plan • Air and noise emissions management plan • Hazardous material management and spill control plan • Water supply and sanitation management at the worksites and workers' accommodations • Management of labour influx and facilities for the foreign workers • Labour recruitment procedures and labour management • Traffic management plan • Training plan for ESHS risks including HIV/AIDS, sexual exploitation and abuse, and gender-based violence • Emergency Response Plan • Grievance Redress Mechanism • Demobilization plan after completion of works	Contractor	PMU, CSC
2. Mobilization of ESHS Specialists	The ESHS Specialists should be mobilized during pre-construction for preparation of C-ESMP	The Contractor shall submit the CVs of following ESHS Specialists for PMU review and approval, and mobilize them • ESHS Manager • Environmental Officer • OHS Officer	Contractor	PMU, CSC

Condition	The rationale for the inclusion of this Condition	Description of the Condition	Responsibility	
			Implementation	Supervision
		Social Officer The ESHS Specialists should be present at the site throughout the construction period.		
3. The hiring of Construction Labour	Hiring procedure for construction workers including the signing of code of conduct	Provisions in labour management procedures (LMP) will be followed. The Procedures will include terms and conditions of employment, including hours of work, wages, overtime, compensation and benefits, holidays, leaves, and so on. The procedures will set out measures to prevent and address harassment, intimidation and/or exploitation. All workers shall sign the code of conduct and they will be terminated from employment if not complied with the code of conduct.	Contractor	PMU, CSO
5. Construction camp and storage facilities	The contractor will need areas for setting up camp and storage areas.	Contractor shall set up camp and storage facilities within sites approved by the PMU with the adequate facilities	Contractor	PMU

6.3.2 Construction Stage Mitigation Plans

Detailed mitigation plans for construction stage impacts have been prepared on the basis of the detailed impact assessment covered under Chapter 5 and presented in **Table 6.3**. These plans are project-specific, and to the extent possible, site-specific, however, contractors will be required to carry out further detailing of the key aspects, to prepare site-specific management plans as part of C-ESMP for review and approval of PMU.

Table 6.3: ESHS Impacts and Risks in Construction and Mitigation Measures

(Note: PMU will include this Table in the Contract Specifications of the Bidding Documents)

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
1. Generation of spoils (excess excavation) and their disposal	- recycling the excavated road material to the maximum extent possible by using them as the aggregate material in the base subbase, concrete works, and filling of embankments and retaining structures - If spoil disposal is needed, the borrow sites developed for the project will be used as spoil disposal sites. The spoils will be used for the restoration of the borrow sites.	Contractor	PMU CSC
2. Generation of construction waste including hazardous waste	- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan, including hazardous waste management and submit it to the PMU for their review and approval. The plan will cover - manage hazardous material use, storage, transport, and disposal. - The contractor will place containers of adequate size and numbers in place for the collection of various types of wastes (metal, rubbers, used fuels, batteries, etc.) from the worksites, and transport these wastes regularly to a centralized facility. - The contractor will return the empty containers to the suppliers. - Handling chemicals properly. Storage of chemicals 100 meters away from any water sources	Contractor	PMU CSC
3. Generation of solid waste from worker's campsites and offices	- Before commencing the construction activities, the contractor will be required to prepare a Waste Management Plan and submit it to the PMU for their review and approval. - Collection and segregation of solid waste into kitchen waste (organics), paper and plastic (recyclable) and garbage (non-recyclable). Three kinds of waste bins (with different colors) with adequate numbers and capacities will be placed at the campsite (kitchen, offices, rooms) for the segregation of the waste at source. - Organic waste will be treated through onsite composting - Procure the services of waste management contractors for the collection and management of recyclable waste. Recyclable waste will be compressed through bailers to minimize the volume of waste to be stored and transported.	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	Local municipal waste disposal sites will be used for the disposal of garbage. No disposal sites will be established by the contractor.		
4. Wastewater discharges from the construction camps, sites, and batching plants	- Sedimentation ponds, of adequate size and capacity, will be built for the treatment of discharges from the batching plants and the crushing plants to allow the sediments to settle. Final discharges from the sedimentation ponds shall comply with World Bank EHS standards for wastewater standards. The settled sediments will be periodically removed and will be disposed of at the designated spoil disposal sites. - Construction of wastewater treatment facilities at the campsite (e.g., septic tank and soak pit) and site drainage) - The contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the water - Quarterly monitoring of wastewater quality to ensure compliance with the standards	Contractor	PMU CSC
5. The risk of soil pollution by construction works	- Storage of fuels and chemicals in contained facilities and take appropriate measures to avoid and contain any spillage - confine the contaminants immediately after such accidental spillage and cleanup of oil spills using spill kits. - Collect contaminated soils, treat and dispose of them as a hazardous waste - Topsoil from cultivated lands in the construction areas to be stripped and stockpiled where practical for later use for restoration of spoil disposal sites. - Temporary stockpiles to be protected from erosion. - Contractor will develop pollution prevention and emergency response plan as part of C-ESMP and submit for PMU approval. The plan will details procedures to minimise and address risk of soil and water pollution.	Contractor	PMU CSC
6. Air and noise pollution from construction	- Construction equipment and vehicles will be well maintained so that emissions are minimal and comply with emission standards of Nepal Vehicle Emission Standards 2012. - Crushing and batching and asphalt plants will be located a minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	- Dust generation from construction sites would be restricted as much as possible, and water sprinkling would be carried out throughout the construction period. - Construction activities near the settlements will be limited to daytime only - High noise-producing equipment will be provided with mufflers or acoustic enclosures. - A GRM will be put in place to receive complaints from the public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting the necessary measures. - Quarterly air and noise quality monitoring will be carried out in the project area to ensure compliance with national on ambient air and noise quality		
7. Sourcing of aggregates for concrete works and earth for embankment filling	- The contractor will develop quarry and borrow areas procurement and management plan submit it for approval of PMU. - The contractor shall use the government-approved quarry sites for the procurement of aggregates. - Reuse of excavated material from the construction sites to the extent feasible. - Source the material from the dry river beds and the non-perennial streams. - Although the material is widely available, the quarrying/mining activities will be limited to fewer areas to reduce the area of extent affected by quarrying activities. If any mining activities are to be carried outside the project area, they should be not be located in any sensitive areas. - Maintain a buffer zone of 5 to 10m between the low flow channel and the mining operations to minimize the downstream impacts and limit the excavation activities to the low flow season (non-monsoon). - Borrow sites will be restored after completion of the works	Contractor	PMU CSC
8. Impact on river habitat due to bridge construction activities and quarrying	- Contractor will use the existing quarry sites operated with the government licenses. - No new sites will be established by the contractor. If any new sites to be developed, contractor will develop quarry and borrow pit operation plan and obtained approval from supervision engineers prior to operation of quarry. - Avoid haphazard quarry along the riverbank and hills. Permanent barricade at quarry location for safety, established safety signage boards, and installed noise barrier. - Control of wastewater and sediment releases to river	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into the River. - Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil and lubricants, and grease. - Machinery leaking fuel, lubricants, hydraulic fluids, or solvents shall not work within the river. - Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use - Restoration of the borrow sites after completion of the works		
9. Impacts on flora	- The contractor's code of conduct for workers will include conditions on the protection of flora and fauna and ban on cutting of trees and ban on hunting and poaching of wildlife. Employees found violating would be subject to strict actions including fines and termination of employment. - Use of non-wood fuel for cooking and heating. - No temporary construction facilities will be establish in the forest areas - Awareness-raising to workers on the protection of flora and fauna - For road widening, the dense vegetation will only be cleared once it has been established that any individuals present have fled. Before and during vegetation clearance or tree felling, any animals found will be removed and released to a safe place. There should be no burning of natural vegetation. The borrow animals, if found during excavation, shall also be transported to a safe place.	Contractor	PMU CSC
10. Impact on fauna, including wildlife movement	- No workers camps and construction facilities should be constructed in the forest areas - Rehabilitation of existing barbwire fence in Saljhandi-Pipara forest considering wildlife protection - Installation of a fence in Gorusinghe forest block considering wildlife conservation and effectiveness - Culvert/tunnel installation in the forest blocks based on the additional study on mammal movement/roadkill - Installation of traffic signs alerting speed limit - Installation of wildlife crossing information/display board at 1km span and speed breakers in the forest blocks		

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Compensatory plantation (mainly, identification of location, preparation of nursery) • Awareness-raising workshops with the forest user groups at the forest blocks regarding wildlife behaviors, road kills, wildlife poaching, human-wildlife conflict and traffic regulations • Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution • Inclusion of wildlife protection clauses in the code of conduct for contractors • Construction site should be fenced to prevent the wildlife entry to the construction site • Regular visual inspection of wildlife will be conducted by ecologist appointed in the contractors. • Spill kits should be provided at each construction site where oils and chemicals are used. • Regular maintenance of construction equipment and vehicle will be undertaken • Oils and chemicals should be stored at designated storage with proposed spill/accident prevention and response measures such as the provision of secondary containment, MSDS and spill kit • The organic waste should be properly stored and composted. Following mitigation measures will be implemented to address the impacts on <u>avifauna and snakes</u>: • The construction materials and their by-products should be stored away from watercourses. Especially, during summer/monsoon time, good care should be taken. • No construction activities during the night time • Large sapling plantation at road side should be carried as soon as the construction work completed. This will increase bird habitat, foraging and roosting trees specially in semi urban and rural area • Road side plantation be made of the species which bear seed/fruit and have open/light canopy like simal (<i>Bombax ceiba</i>), etc. • Ensure use of machines those produced low noise where feasible.		

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	• Unnecessary noise generation during the construction work and post construction should be avoided through regular awareness and traffic no-horn zones. • Training provision to workers on the potential impacts from their behavior including wildlife poaching and habitat degradation/pollution • Inclusion of wildlife protection clauses in the code of conduct for contractors		
11. Workers Safety risks	• The contractor will be required to prepare, obtain approval of, and implement an occupational health and safety (OHS) plan. These plans will be prepared in compliance with the World Bank Group's EHSs and national regulations. If these guidelines cannot address any specific aspect of OHS, international good practices such as OSHA and ILO will be applied. OHS Plan should contain general guidance for all identified hazards under each work activities, and site-specific OHS hazard and risks during construction, and control and preventive Measures proposed by the Contractor. The Plan shall be reviewed and updated if there any changes in the construction methodologies. • OHS Plan should contain general guidance for all identified hazards under each work activities and they should be presented in three discrete headings, (a) Contractor's Standards on the identified hazard management, (b) Expected Site-specific OHS hazard and risks during construction, and (c) Control and Preventive Measures proposed by the Contractor. • The OHS plan will be reviewed and approved the Construction Supervision Consultant and the World Bank • Conduct a 'job hazard analysis' at the new construction site to identify potential hazards that may arise from the proposed works or working conditions to the project workers and implement necessary control measures. The job hazard analysis should be part of the contractor's method statements, which will be reviewed and approved by the supervision consultants. The specialists of the supervision consultant will also visit the construction sites, prior to the start of construction, to ensure the control measures are in place. • Regular site inspections and safety audits by the construction supervision team, both by the OHS specialist and the site engineers. Since the site engineers will present at the worksites all the time, they will be trained by their OHS team on monitoring safety aspects of the construction works. • Regular training program for workers on occupational health safety (monthly training and daily toolbox talks). Special attention will be focused on safety training	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	for workers to prevent and restrict accidents and on the knowledge of how to deal with emergencies. • Incident investigation and reporting, including a complete record of accidents and near misses, will be maintained. • In order to protect all project personnel and visitors, the Contractor will provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, body harness, protective clothing, goggles, fully face eye shields and ear protection. The contractor will also provide training to workers on how to use them and maintain in a sanitary and reliable condition and replace the damaged ones immediately with the new one. • Availability of firefighting, ambulance, medical and rescue facilities at the site for implementation of an emergency response plan • Adequate water supply and mobile toilets, medical and first aid care facilities at the worksites • Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan • Awareness-raising material will be used including posters, signage, booklets, and others at the worksites • A complete record of accidents and near misses will be maintained. • First aid facilities will be made available at the worksites and in the camps. The contractors will engage qualified first aider(s).		
12. Occupational health risks in construction	• The contractor will develop and implement a camp management plan • The construction camp will be built with all adequate facilities (safe drinking water and sanitation, kitchen, rest areas, etc.) including entertainment facilities so that there will be minimal interaction between them and local communities • Separate facilities will be provided to men and women workers • The Contractor shall establish a mechanism to collect the complaints from the workers and address those complaints by the approved GRM plan	Contractor	PMU CSC
13. Safety hazards due to increased traffic especially for children and elderly people	• The contractor will develop and implement a traffic management plan with adequate measures such as proposing traffic diversion measures, alternate routes for local traffic, avoiding school hours, following speed limits, hiring licensed drivers, etc.). The plan will be implemented with the aim of ensuring access to	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	residential areas and preventing unsafe situations, especially near schools, housing areas, construction areas • The road should not be stopped for existing traffic. The contractor will maintain the traffic on both sides of the highway by placing appropriate control measures and flagmen. • Road signage will be fixed at appropriate locations to reduce safety hazards associated with project-related vehicular traffic. • Liaison with traffic police will be maintained • Project drivers will be trained in defensive driving. • Ensure that all construction vehicles observe speed limits on the construction sites and on public roads • Provide adequate signage, barriers, and flag persons for traffic control.		
14 . Community exposure to work hazards, STIs and communicable diseases	• Barricade the work areas with hard fencing to prevent the entry of community in the construction areas. • Placing of adequate signboards and flagmen to divert the community away from the construction works. • Implementation of traffic management plan near the construction sites • Community awareness programs on construction-related hazards, including awareness programs in schools Construction activities such as blasting and excavation, particularly at the borrow areas, may pose safety risks to the nearby population. • First aid medical facilities will be made available at the worksite. • Campaigns on STIs and communicable diseases (e.g. HIV/AIDs, COVID-19)	Contractor	PMU CSC
15. Dust from vehicular movement on local roads and construction activities	• Dust generation from construction sites will be restricted as much as possible and water sprinkling will be carried out as appropriate, especially at those places where earthmoving, excavation will be carried out. • Frequent sprinkling of water on the local roads and worksites to control dust emissions. The contractor has to mobilize adequate water sprinkling trucks. • A GRM will be put in place to receive and address complaints from the public on various aspects of environmental issues, including dust pollution.	Contractor	PMU CSC
16. Employment opportunities in construction activities	• encourage to engage local workers/laborers with the same terms and condition of outside workers/laborers;	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
	- integrating provisions to redress labour related grievances in the Grievance Redress Mechanism (GRM) which should be well known to the laborers/workers and accessible; - prohibition of child labor; - no engagement of forced and bonded labor; - provision of a safe and healthy working environment to workers; and - taking steps to prevent accidents, injury, and disease and appropriate treatment for those suffering from occupational injuries/diseases; and encourage for insurance facility for workers		
17. Risk of child labor	No hiring of workers less than 18 years of age		
18. Impacts from the influx of labor from the outside areas	- This situation will be addressed by an awareness campaign implemented at the beginning of the construction phase. The Contractors will be aware of the possibility and risks of miscommunications between local residents and workers, which easily could lead to conflicts. This will be prevented by raising awareness and implementing a Code of Conduct for the workers. The Contractor shall develop a Worker Code of Conduct to govern the behavior of workers on-site, in camps, and in local communities. - The awareness campaign will also be aimed at the risk of interaction between the resident population and the construction workforce, including the spreading of sexually transmitted diseases such as HIV/AIDS. - The contractor will prepare a labour management plan prior to construction works for approval of PMU. - The contractor's code of conduct shall cover the program to promote awareness to the construction workers on respecting the local community. - Construction camps will be built in the designated areas, located away from the local settlements - The contractor will ensure local water usage will not be affected by the project water usage by the project or compete with water requirements of the local community - The Contractor's monthly training program will cover topics related to respectful attitude while interacting with the local community - COVID-19 protocol measures, specified in the World Bank guidelines, will be complied	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
19. Risk of gender-based violence GBV/Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH)	• Inclusion of clause on GBV/SEA/SH behavior obligations in the employment contracts of all employees and construction workers aimed at strengthening measures to address and prevent SEA/SH in the workplace and construction areas. • Awareness training of DRO, CSC, contractor, sub-contractor and service providers staff to sensitize them about SEA, and SH, and their responsibilities to prevent • Posting of CoC standards in public spaces at contractor's work camps and living areas, and village information centers and public places of adjoining/neighborhood communities in the Nepali language • Raising awareness that SEA/SH is prohibited • Awareness to explain suspicious situations and the signs of SEA/SH; • Provide information on the use of GRM to report cases of SEA/SH, Code of Conduct breaches and assist victims of SEA, if signs of SEA are identified/a victim approaches them to complain about SEA; • Awareness to communities, particularly women, and male and female children to understand risks of SEA and SH and the roles and responsibilities of parties involved in project implementation on SEA and SH prevention, processes for reporting incidents of project-related SEA/SH, and the corresponding accountability structures. • Strengthen the Contractors' obligations and capacity to public health and safety risks and ensure contractor supervision capacity to monitor the mitigation of these risks. • Proactive GBV/SEA prevention measures will be put in place, such as GBV/SEA related training to sensitize workers and local population along the project implementation area and ensuring that GRM for the project will also take care of GBV related issues if any. • There will be adequate mechanisms in place to protect the local vulnerable population, especially women and minors from risks associated with the influx of workers (harassment, underage sex). This mechanism will ensure the sensitization and enforcement of code-of-conduct by the Contractor employees and workers and all other parties that are involved in the project implementation. • Additionally, the Contractor will employ their skilled staff and apply unskilled construction labor from the local population as far as possible to minimize an influx of outsiders into the communities	Contractor	PMU CSC

Impact	Mitigation Measures	Responsibility	
		Implementation	Supervision
19 Chance finds during construction	Chance find procedures which will be used during this Project are as follows: • Stop the construction activities in the area of the chance find; • Delineate the discovered site or area; • Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a nightguard shall be present until the responsible local authorities and relevant Department of Archaeology take over; • Notify the supervisory Engineer who in turn will notify the responsible local authorities and relevant Department of Archaeology immediately (within 24 hours or less); • Responsible local authorities and relevant Department of Archaeology would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historical, scientific or research, social and economic values; • Decisions on how to handle the finding shall be taken by the local authorities and the relevant Department of Archaeology. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration, and salvage; • Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the relevant Department of Archaeology; and • Construction work could resume only after permission is given from the local authorities and relevant Department of Archaeology concerning the safeguard of the heritage.	Contractor	PMU and CSC

6.3.3 Construction Stage Monitoring Plans

The proposed monitoring plan to be carried out during the construction stage of the Project to ensure contractors are complying with the mitigation measures is given in **Table 9.5**, along with the monitoring indicators and frequency. CSC will be responsible for the supervision of the implementation of the plan. The total cost of monitoring has been estimated at USD xx million.

Table 6.4: Effects Monitoring Plan During Construction

(Note: PMU will include this Table in the Contract Specifications of the Bidding Documents)

E&S components	Monitoring parameters	Monitoring Agency	Timeline
Physical Environment			
Air quality	Ambient air quality: TSP and PM ₁₀	PMU/CSC	Baseline information during preconstruction stage and during construction stage once in every month
Water quality	Turbidity, Conductivity, pH and Color will be conducted at site with the help of portable kits, effluents from construction camps /sites/ waste from batching plants etc.	PMU/CSC	Baseline information during preconstruction stage of nearby water bodies and during construction stage once in every month
Noise	Noise level at regular interval: assessment and interpretation for L _{max} , L _{min} , L _{eq} , L ₅ , L ₁₀ , L ₅₀ , L ₉₀ and L ₉₅ parameters.	PMU/CSC	Baseline information during preconstruction stage and during construction stage once every month
Spoil/Muck/ disposal	Disposal of Spoil/Muck at designated sites	PMU/CSC	Daily during the construction stage
Stockpiling of construction Materials	Stockpiling of construction materials at designated sites Covering of Stockpiles with tarpaulin sheets	PMU/CSC	Daily during the construction stage
Slope stability	Presence of landslides, gully formations due to runoff	PMU/CSC	Daily during the construction stage
Operation of Borrow pits/ Quarry sites/ Stone crushing plants	Quantity of extracted material, restoration of borrow pit areas, Grievance Redressal of the locals	PMU/CSC	Daily during the construction stage
Extraction of river bed materials	Distance of extraction sites from the river banks (5-10 m) Depth of the ditch for excavation (1m)	PMU/CSC	Daily during the construction stage
Obstruction of drainage	Roadside drainage discharge, water impounding area during rain, waterlogging	PMU/CSC	Daily during the construction stage
Hazardous wastes, bitumen/asphalt	List of chemicals, storage, and handling practice. Records of accident/ spillage of chemicals, surface and groundwater contamination	PMU/CSC	Daily during the construction stage
Biological Environment			
Number of felled trees	Statistics of removed and planted trees, nurseries and plantations	PMU/CSC, Divisional Forest Office (DFO)	During the time of tree felling on a daily basis
Compensatory Plantation	Compliance with compensatory plantation plan	PMU/CSC, Divisional Forest Office (DFO)	Plantation time during monsoon (before and after carrying out the plantation)

E&S components	Monitoring parameters	Monitoring Agency	Timeline
Wildlife	Identification of flora and fauna with ecological importance identified in the project area, road kill	PMU/CSC	Daily during the construction stage
Fire-hazard	Project management checklists, site monitoring, fire-extinguishers in labour camps	PMUs/CSCs	Daily during the construction stage
Social Environment			
Community Health and safety	Nuisance to adjoining communities from the construction related works, grievances due to annoyance from the construction related works.	PMU/CSC	Daily during the construction stage
Establishment of camps	Compliance with Camp management plan of Contractor	PMU/CSC	Daily during the construction stage
Property/land acquisition/compensation and rehabilitation	Implementation of compensation and rehabilitation measures provided by the RAP, including compliance with construction-induced impact procedures	PMU/CSC	During the preconstruction and construction stage
Indigenous Peoples	Compliance with IDPD	PMU/CSC	Daily during the construction stage
Safety of workers	Accident Group Insurance of Workers, provision of personal protective equipment/ Use of ear muffs and other personal protective equipment by the workers	PMU/CSC	Daily during the construction stage
Road safety	Traffic Signals, no horn signs, road signals and markings, speed control and GPS-tracking	PMU/CSC	Daily during the construction stage
Grievance Redressal	Management of Grievance Redress Mechanism	PMU/CSC	During the construction stage
Traffic Management	Compliance with Traffic Management Plan	PMU/CSC, Traffic Police, Respective Chief District Officers	Daily during the construction stage
Gender-based violence and human trafficking	Living status of women and vulnerable households after the implementation of project	PMU/CSC	Daily during the construction stage
Stakeholder engagement	Compliance with SEP	PMU/CSC	During the preconstruction and construction stage

6.3.4 Reporting on ESMP Compliance

PMU and its Contractors will prepare periodic monitoring reports on the status of implementation of ESMP and will be submitted to World Bank for their review and feedback. Details of these reports and their content are given in **Table 6.5**.

Table 6.5: ESMP Monitoring and Compliance Reports

#	Title of the Report	Contents of the Report	Frequency of Report Preparation	Report to be prepared by
1	ESHS Monitoring Report	The compliance status of the Project with environmental and social mitigation and monitoring measures. Besides, the report also covers: • environmental incidents; • health and safety incidents,	Monthly	Contractor

#	Title of the Report	Contents of the Report	Frequency of Report Preparation	Report to be prepared by
		• health and safety supervision: • Usage of PPEs by workers • worker accommodations • Training conducted and workers participated • Workers grievances • Community grievances • Chance find (if any)		
2	ESMP Monitoring Report	The compliance status of overall Project with ESMP requirements	Quarterly	PMU
3	Incident Reports	Incident investigation reports for all major incidents covering details of the incident, root cause analysis, and actions taken to address the future recurrence of this event	Initial investigation report within 24 hours Detailed Investigation Report within ten days	Contractor

6.4 Environmental and Social Management During Operation

6.4.1 O&M Stage Mitigation Plans

Detailed mitigation plans for operation and maintenance (O&M) stage impacts have been prepared on the basis of the detailed impact assessment covered under Chapter 5.

Table 6.6: ESHS Impacts and Risks in O&M and Mitigation Measures

Impact	Mitigation Measures	Responsibility for implementation
1. workers health and safety during routine maintenance works	• equipment by: ○ Routing of traffic to alternative roads when possible ○ Closure of lanes and diversion of traffic to the remaining lanes if the road is wide enough (e.g. rerouting of all traffic to one side of a multi-lane highway) ○ Where worker exposure to traffic cannot be completely eliminated, use of protective barriers to shield worker from traffic vehicles, or installation of channeling devices(e.g. traffic cones and barrels) to delineate the work zone ○ Regulation of traffic flow by warning lights, avoiding the use of flaggers if possible ○ Design of the work space to eliminate or decrease blind spots • Reduction of maximum vehicle speeds in work zones; • Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles; and safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).	DOR O&M Staff
2. Community health and safety from exposure to maintenance works	• Provision of safe corridors along the road alignment and construction areas, including and bridges (e.g. paths separated from the roadway), and safe crossings (preferably over or under the roadway) for pedestrians and bicyclists during operation. Crossing locations should take into account community preferences, including those related to convenience or personal safety (e.g. the prevalence of crime at potential crossing point locations). • Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points; ○ Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas;	DOR O&M Staff

Impact	Mitigation Measures	Responsibility for implementation
	○ Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways • Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions; ○ Setting of speed limits appropriate to the road and traffic conditions • Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross; construction of animal crossing structures; installation of fencing along the roadway to direct animals toward crossing structures; and use of reflectors along the roadside to deter animal crossings at night when vehicles are approaching) • Implementation of No Blowing of Horn Zones particularly in settlement areas • Installation of Signages • Monitoring noise level maintained at national standard • The detailed design of BG road improvements integrates the findings and recommendations of the road safety audits undertaken in multiple stages • Road safety will also be undertaken post completion works • Road safety awareness • Speed control and regulations (especially in populated areas, near schools and other public places). • Road crossing infrastructures incorporating principal of universal access. • Speed control mechanisms at place such as zebra cross, speed breakers, speed limits at crowded places etc. • Establishment of traffic signals, GPS tracking and CC cameras for speed control for public buses plying the highway. • Vehicle maintenance and inspection. Control loud horns to avoid sound pollution. • Training of first-aid services in the case of accident. • Manage temporary bypass while constructing the road. • Road safety awareness trainings to general public. • Capacity enhancement for traffic police and locals.	
3. Impact on Flora and Fauna	• Recording the road kill at three forest blocks in coordination with divisional forest offices • Monitoring the use of culvert by wildlife species, especially snakes and other reptiles	

Impact	Mitigation Measures	Responsibility for implementation
	- Assessment of need of additional culvert/wildlife crossing structures long the road based on the monitoring result - Compensatory plantation (including monitoring and maintenance of saplings) - Regular cleaning/ clearing and maintenance of all culverts to reduce the chances of failures and blocking - Regular inspection and maintenance of fencing installed/maintained in the forest areas - Installation of signboard to raise awareness to reduce waste dumping from vehicles in the forest blocks. - Holding workshops for awareness-raising on wildlife protection such as prevention of waste dumping from vehicles, speed limit, potential collision with animals. - Continuous monitoring of herpetofauna species movement/crossing and road kill in the forest area - Introduction of no-horn zone in the forest blocks - Installation of traffic signs alerting speed limit - Installation of wildlife crossing information/display board at 1km span and traffic calming measures in the forest blocks	

6.4.2 O&M Stage Monitoring Plans

The proposed monitoring plan to be carried during the O&M stages of the Project is given in **Table 9.8** along with the monitoring indicators and frequency. PMU's ESU staff will be responsible for the implementation of the plan.

Table 6.7: Effects Monitoring Plan During O&M

Parameter	Means of Monitoring	Frequency	Responsibility	
			Implementation	Supervision
Noise Quality	Field Measurements	Yearly	DOR O&M Staff	DCID
Air Quality	Field Sampling and Analysis	Yearly	DOR O&M Staff	DCID
Traffic Safety	CC TV Cameras, site monitoring	Continuous monitoring	DOR O&M Staff	DCID
Wildlife	Trail camera, site monitoring	Continuous monitoring	MoFE, Divisional Forest Office	DCID

6.5 Capacity Building and Training

The environmental and social training will help to ensure that the requirements of the ESMP are clearly understood and followed by all project personnel. The competencies of the Consultant to be selected for capacity building training will include a thorough knowledge and experience of WB Environmental and Social Framework (ESF) and ESHGS guidelines. The trainings will be provided to different professional groups separately, such as managers, skilled personnel, unskilled labors, and camp staff. Capacity building

will be aimed at strengthening the PUO staff in the field of environmental management and social development. Safeguard staff of PMU responsible for the supervision of environmental and social mitigation measures would be trained in environmental management, environmental quality control, ecology, environmental awareness, labor and working conditions, and social development. The contractor will also be required to provide environmental and social trainings to its staff to ensure the effective implementation of the ESMP. A budget of USD 0.1 million has been earmarked for capacity building. The training plan shall include a program for the delivery of intermittent training to cover the subjects included in **Table 6.8**. Training should be carried out initially at the induction of staff and repeated throughout the project.

Table 6.8: Environmental and Social Training Programs

Contents	Participants	Trainer	Schedule
Environmental and social impacts of the Project and ESMP requirements of the Contractor; World Bank Group Environmental Health and Safety Guidelines. The contents for the second and subsequent training programs will cover topics related to the issues associated with on-going construction activities.	All the technical Staff of PMU, DCIE, and relevant technical staff of DRO who are involved in the management of environmental and social issues associated with routine operation and maintenance of the airport. Site Engineers of the Supervision Consultants/Engineer.	ESHS staff of the CSC; and an external training agency who has a thorough knowledge of the WB safeguard policies and guidelines	During the initial stages of the Project implementation. The training will be repeated every six months.
Environmental and Social issues associated with the ongoing construction works; Workers' health and safety	Site Engineers of the Contractor, PMU, and the CSC	E&S staff of the CSC, PMU	On a monthly basis
Code of Conduct Occupational Health and Safety	Construction crew	Contractors ESHS Staff	Prior to the start of the construction activities and during the construction activities (To be repeated as needed.)

6.6 Budget for Implementation of ESIA

The total cost of the ESMP implementation is estimated to be USD 1.24 million (**Table 6.9**).

Table 6.9: Cost Estimates for ESMP Implementation

Sr. No.	Description of Item	Unit	Item Total (USD)
A	Contractors Budget		
1.	Contractors preparation of C-ESMP including OHC Plans		Included in construction cost
2	Contractors ESHS Staff		Included in construction cost
3.	Waste Management (procurement of waste management services and facilities)	LS	50,000
4	Dust Management (procurement and operation of sprinklers)	LS	100,000
5	Site/OHS facilities for workers (PPE)	LS	50,000
6	Training of Workers on Code of Conduct (incl. GBV/SH/AIDs)	LS	50,000
8	Wastewater treatment facilities (incl. mobile toilets at worksites)	LS	20,000
10	Environmental Monitoring during construction by a third party (wastewater quality, air, and noise quality) - every 3 months (4 years) at 9 locations	LS	100,000
B.	DOR's Budget		
1.	Tree Plantation	LS	300,000
2	Capacity building		Covered in ESMF
3.	COVID-19 Orientation to local communities		20,000
4.	Fencing of the Forest Areas		200,000
5	Wildlife studies, monitoring , recording and community awareness raising		200,000
C.	Contingency		
	Contingency (25% of A+B)		272,500
	Total		1,362,500

7 Institutional Arrangements

Details of institutional arrangement for implementation of the ESMP are given in this chapter.

7.1 Existing institutional arrangements for implementation of ESMP during the project construction

The principal responsibility for implementation of ESMP is the Department of Roads (DoR) and Ministry of Physical Infrastructure and Transport (MoPIT).

7.1.1 Department of Roads

DoR is thus directly responsible for managing the E&S risks of individual projects during implementation.

DoR has five (5) deputy directorships /branches that develop and implement projects. These are: (1) the Planning and Design Branch, which develops and implements all GoN-funded roads; (2) the Bridges Branch, which is in charge of the development of bridges; (3) the Maintenance Branch, which is in charge of the repair and rehabilitation of roads and bridges; (4) the Development Cooperation Implementation Division, which handles donor- funded projects; and, (5) the ADB Directorate, which handles all roads and bridges projects funded by ADB. To implement a project, a project management unit (PMU) in the case of donor-funded projects is usually created within related branches.

7.1.2 DCID/Project Management Office (PMU)

Development Cooperation Implementation Division (DCID)/PMU handles for donor- funded projects. The DCID/PMU will organized ESMP implementation according to agreed with the donor, usually prepare their own ESIAs, RAPs and other E&S Risk Management Plans by hiring their own consultants. PMU would often seek GESU's involvement to fulfil legal requirements, particularly in bringing the IEE/ESIA through the formal review-approval process with MoPIT and MoFE and, depending on the specifications agreed with the donor, the PMU may tap GESU to undertake the EIA/IEE preparation process for their projects and/or provide compliance monitoring in the field. DCID/PMU has Environmental Safeguard expert, Social Safeguard Expert, Occupational Health and Safety Specialist and Gender Specialist.

Geo-Environment and Social Unit (GESU)

The focal point for the E&S risk management of DoR is GESU. GESU is currently under the Planning and Design branch. GESU provides advisory services to units of DoR on environmental and social safeguards matters. Its main role is to prepare IEEs and EIAs for the DoR projects and coordinate with MoPIT in the case of IEEs and by the MoFE in the case of EIAs. GESU interacts with the Environment Unit of MoPIT as well as that of MoFE. For donor-funded projects, the GESU also undertakes compliance monitoring and auditing of projects, and as result also interacts with Project Management Units (PMUs). The role of the GESU is very important not only in environmental and social analyses is and ensuring stakeholders' participation in the planning and implementation process, but also for improved efficiency, effectiveness and sustainability of the projects. Although, the need for right of way acquisition is identified in EIA/ESIA, GESU is not normally involved in the land acquisition, and hence, rarely if at all interacts with the land agencies. Sometimes, RAPs from donor-funded project are submitted to the GESU for review. GESU has dedicated Environmental Inspector and Social Officer, and supporting consultants.

7.1.3 Divisional Offices of DoR

DoR has 4 Federal Road Monitoring Units which are geographically situated and 30 Divisional Offices. These offices will serve as the home base for Federal Government's road project implementation where

coordination of the local government agencies and field offices of other line agencies will occur, particularly for RoW/land acquisition. There is no any Environmental Officer and Social Officer.

7.1.4 Ministry of Physical Infrastructure and Transport (MoPIT)

MoPIT is the mother agency of the DoR and is mandated by the Environmental Protection Act to review and approve IEEs for projects in public works and transport sector. It also reviews and endorses EIA reports for review and approval of the MoFE. The Ministry will also be the one to authorize the Project Management Unit (PMU) to initiate preliminary action for land acquisition. This function is handled by the Environment and Social section under the Planning, Monitoring and Evaluation Division of MoPIT.

7.1.5 EIA Unit under Ministry of Forest and Environment (MoFE)

This unit tasks is to undertake review and approval of EIAs. It is reporting directly to the Ministry and not part of the Department of Environment. This unit convenes and engages multidisciplinary team to constitute the EIA Review Committee for each EIA submitted from approval. The EIA approvals typically include conditions which the project must comply or implement in addition to the EMP/ESMP. Department of Environment is responsible for monitoring of the project.

7.1.6 Department of Forestry and Soil Conservation (DoFSC)

DoFSC under the MoFE reviews and approves applications for RoW of road sections falling within areas classified as public forest. The DoFSC imposes conditions on the acquisition of right of way on forest lands, such as replacement of cut trees. After complying with the requirements, the ownership of right of way is transferred to the concerned agency (for roads: MoPIT).

7.1.7 Department of National Parks and Wildlife Conservation (DNPWC)

DNPWC under MoFE reviews and approves sections of roads within National Parks and protected areas(The project done not required approval from DNPWC).

7.1.8 Department of Labour and Occupational Safety (DoLOS)

DoLOS under the Ministry of Labour and Social Security is currently not involved in the E&S risk management (i.e. it has no role in the IEE/EIA process) of development projects. Its role is mainly on the regulatory side. It can formulate and issue policies, rules and standards for OHS consistent with the law. As such, it can occasionally conduct monitoring and audit of workplaces, construction sites and offices of contractors and project management. It can also provide an expert review of the occupational and community health and safety aspects of the IEE/EIA or the ESMP.

7.1.9 District Coordination Committees (DCC).

DCCs can regulate soil and water conservation activities. DCCs are also responsible for reviewing applications of eminent domain land acquisitions and confirming public use. It will be responsible for the issuance of land acquisition notice; the formation of Compensation Fixing Committee which would determine fair compensation; finalize the list of land owners to receive compensation.

7.1.10 Municipalities and Rural Municipalities

The respective Municipality can regulate quarry, soil and water conservation activities that support to stabilize the road slopes and minimize likely adverse impacts on the road and by the road. Public hearings of the IEE/EIA shall be done in the municipalities/ rural municipalities results and based on it endorse the

project. The MoPIT/MoFE will not approve IEE/EIAs without the endorsement/ providing recommendation letter of municipalities.

7.1.11 Department of Archaeology

It regulates all archaeological activities in the country as per the provision of the Ancient Monument Preservation Act (1956). The department is also charged with protection, preservation and management of the World Cultural Heritage Sites and maintains an inventory of the cultural heritage sites.

7.1.12 Supervision Consultant (SC)

Supervision Consultant will be responsible for supervision of environmental and social mitigation measures as per ESMP and compliance monitoring of the construction contractor's activities, and prepare periodic monitoring reports for submission to WB and DCID/PMU. Review monthly monitoring report submitted by Contractors, Identify needed corrective actions and follow-up actions, Conduct regular site inspection to validate monitoring reports and identify unanticipated environmental impacts, Compel contractors to take corrective actions within specified timeframe to address non-compliances, organize stakeholder consultations workshops that will serve as the external monitoring mechanism for the project. The SC's team includes one Environmental Safeguard Expert and one Social Safeguards Expert and one Occupational health and Safety Officer who shall directly assist the PMU with its duties.

7.1.13 Contractor

The Contractor shall be primarily responsible for the implementation and internal monitoring of all environmental and social management measures associated with Project design and construction, develop a Contractor's Environmental and Social Management Plan CESMP based on ESMP of the project, which addresses all applicable construction phase, and revise it as needed in order to obtain approval from SC/PMU. The Contractor shall have the sole responsibility for all activities on sites under its control for the duration of construction. This includes the activities of all subcontractors, whether employed or contracted directly or indirectly by the Contractor. Accordingly, it shall be the Contractor's responsibility to ensure that all activities are compliant with Project plans, permit and approval conditions, and any other statutory requirements. Employ qualified Environmental Social Health and Safety (ESHS) Officers (one Environmental Officer, one Social Officer and one OHS Officer) to oversee the Project's ESHS performance and ensure that staffing and resources are adequate, commensurate with the magnitude and timing of work and potential ESHS risks. Submit monthly report to SC/PMU on the status of ESMP implementation, Implement corrective actions as instructed by SC/PMU.

7.2 Environmental and Social Commitment Plan

The key commitments of the government to be given in the ESCP include

- Quarterly submission of reports on the ESHS performance of the project
- Reporting of any incidents within 24 hours of the incident
- Maintaining the PMU with one environment, one social and one OHS specialist
- Preparation of monthly reports by the contractor
- Incorporating the ESMP in the bidding documents
- Implementing the Contractors-ESMP including LMP
- Stakeholder engagement and consultations according to SEP
- Establishing grievance mechanism
- Capacity building of the project staff on World Bank ESF requirements

7.2.1 Capacity building

DCID/PMU has the responsibility to manage the implementation and monitoring of safeguard compliance in BG Road through the proper safeguard staffing. Two staff, one for environment and one for social will be engaged to support the existing E&S specialists of DCID.

DCID/PMU will conduct capacity building to the staffs including DoR, DCIP, PMU, GESU, SC and the Contractor's for managing and monitoring of environmental and social risk and impacts associated with the project activities. The capacity building will focus on following:

- Management of Environmental and Social Risks and Impacts
- WB's Environmental and Social Standards (ESS1-10)
- Provision of Environment Protection Act (EPA), Environmental Protection Rules (EPR), 2020 National Environmental Standards on pollution
- Occupational Health and Safety in road construction
- DoR's ESMF
- Project's ESMP
- Land Acquisition, Restriction on Land Uses and Involuntary Resettlement
- Biodiversity Conservation and Sustainable Management of Living Natural Resources

7.3 Grievance Mechanism

7.3.1 Project related grievances

The project Grievance Redress Mechanism (GRM) addresses overall project-related grievances. The construction-related issues, impacts related to land, private structures acquisition and compensation, relocation and rehabilitation of public utilities, impact on private and public structures, impacts on forest and natural resources, issues of landslide, draining management, road safety, traffic management and community-related grievances etc. will be covered by the project-level GRM.

Any household or stakeholder who feels that they are impacted adverse and material harm caused by the project may contact municipality leaders or local leaders of affected municipalities or rural municipalities who would then forward the complaint to the SC or the stakeholder may contact directly DCID/PMU or DOR. The Municipality and SC staffs will also be ready to receive a complaint and resolve and will take to the higher level of authority if necessary.

Every PAP can appeal to the court if they feel that they were not compensated appropriately. They may appeal to appellate court within 35 days of the public notice given to them.

7.3.2 Grievance related Project workers

A GRM will be established specifically for worker-related grievances, in accordance with ESS2. This includes all issues of project workers. The accommodation (health and sanitation), availability of safety gazettes, equal wages to male and female for works of similar nature, delay in payments, hiring of labours without contract document and GBV. The project workers related GRM will be detailed in the Labour Management Procedures (LMP).

7.3.3 Gender Based Violence (GBV) Related Grievances

This includes issues of Gender Based Violence within the project, workers and in the community level (PAP), where a well-equipped separate mechanism for reporting cases of GBV-local based GBV-GRM with GBV skilled community members will respond to such cases and contractors will need to have a Code of Conduct (CoC) as well as proper documentation of each labourer including social sanctions.

7.3.4 Implementation of GRM in the Project Cycle

Under the DCID, Project Management Unit (PMU) and Supervision Consultant (SC) will establish the project GRM within 1 month from start of the project and before construction work begins. The types of grievances expected to be handled concerning all, either land acquisition or more generally, construction-related grievances, and any other social and environmental issues brought up during construction by affected people who live relatively close to construction sites.

Local households and stakeholders will be informed about the setting up of the Grievance mechanism by the PMU, SC before start of any construction as part of the community mobilization process. Besides, the information board will be in place at construction site with specific information related to the construction works and will provide in local language the description of project and grievance mechanism, where and to whom stakeholders can deliver their complaints, and in what form: verbal or written.

When obtaining the information from the complainant, in verbal or written form, either directly or from the Municipality/District Coordination Committee (DCC) and Community offices PMU/SC office will complete a Grievance Action Form (GAF) to record all grievances and actions taken in a Grievance log. Minimal information recorded in this form will include (i) basic data about the affected person (name, address, contact number); (ii) category of grievance filed (legal, social, environmental, technical/engineering, financial, etc.); (iii) detailed description of grievance; and (iv) type of action taken. The GAF will be filled out by the person receiving a grievance and signed by the affected party and the receiver of the complaint. The affected party will receive a copy signed by both.

DCID/PMU will handle received grievances related to works on the road construction in collaboration with the SC and the construction contractor. In each case, DCID/PMU will be supported by the SC, DOR. The construction contractor will clarify, if the construction works cause the complaint. The SC will inform and update the complainant about the progress of grievance mitigation within 24 hours for urgent issues and 7 days for non-urgent issues.

Once verified problem/complaint is well founded and due to the construction works, decision will be implemented together with the PMU, SC and Contractor. Contractor will take the necessary corrective actions and try to resolve the grievance informally directly with the complainant. If any sort of filled level grievance is not possible to redress or at the choice of the complainant, a formal redress can be forwarded to the Grievance Redress Committee (GRC).

The GRC will be formed to review complaints that cannot be resolved immediately. The committee will be formed by the Project Director of the proponent as a chair, PMU, (SC) and members of local stakeholders involved: Municipality representative, community members, etc. A complainant has the right to appear in person, to be accompanied by a family member, and/or to request to be represented by senior community member. In the event that the contractor, PMU, SC do not address a grievance, the affected person can seek legal redress of the grievance in the appropriate courts under the formal legal court system.

In the case the established GRM is not in a position to resolve the issue, affected people can also use the World Bank Accountability Mechanism through direct contact (in writing) to the World Bank or Government of Nepal (GoN). The complaint can be submitted in any of the official languages of WB or in local Nepali language.

Depending on the complaints and the mitigation measures decided and implemented, if necessary, the ESMP will be updated in order to avoid similar problems afterwards. The SC Safeguard unit will provide monthly reports of any complaint registered, and how it has been dealt with to the local authorities. The SC Safeguard unit will regularly provide information to dissemination to the local stakeholders and

communities of any grievances received and how they have been resolved, through the community mobilization process or through the Communication Strategy Plan implementation.

Grievance recording register will be established at the project office, Contractor's Office and Consultant's RE office as well. Project affected people as well as local people can lodge their complaints at these Offices related to assets acquisition and other social and environmental concerns due to construction related activities.

Special project grievance mechanisms such as on-site provision of complain hearings allows project affected persons to get fair treatment on time. The GRC will be established in each road sections covering affected Rural Municipality/Municipality to handle initial grievances of the project-affected people. The grievant will have unhindered access to the grievance redress office to forward and file complains. The provision of Social Mobilizer in the project implementation is good practices in this regard. Social Mobilizer can be mobilized in order to help grievants to file the complaints to the concerned agency. Grievants will be exempted from all administrative fees incurred, pursuant to the grievance redressed procedures except for cases filed in court Proposed mechanism for grievance resolution is given below:

Stage 1: Complaints of grievants on any aspect of compensation, relocation, or unaddressed losses will be settled in first instance verbally or in written form in field-based project office. The concerned personnel to settle the issues at local level can discuss the complaint in an informal meeting with the grievant. The community consultation, involvement of social and resettlement specialist and environmental specialist will be helpful in this regard. It will be the responsibility of the GRC and Project In-charge to resolve the issue within 15 days from the date of the complaint received.

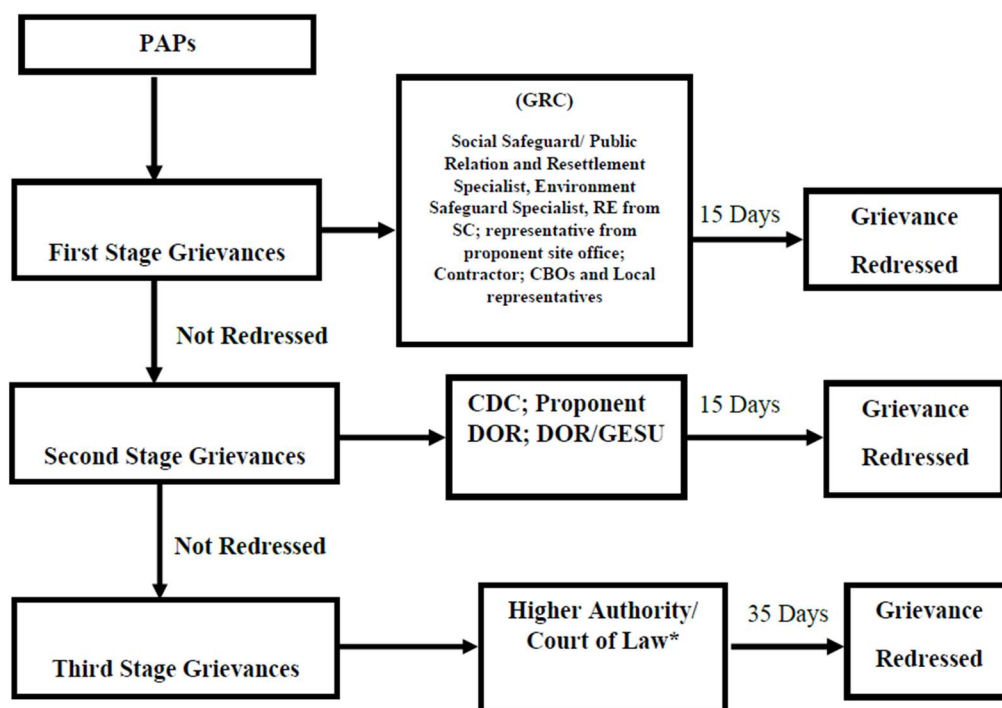


Figure 43: Grievance Redress Mechanism structure in the project cycle

Stage 2: If no understanding or amicable solution reaches or no response from the project office, the grievant can appeal to the project proponent/DOR for compensation Determination Committee (CDC). While lodging the complaint, the grievant must produce documents to support his/her claim. The CDC will

provide the decision within 15 days of registering the appeal. In the case if established GRM is not in a position to resolve the issue, affected people can also use the World Bank Accountability Mechanism through direct contact (in writing) to the World Bank or Government of Nepal (GoN).

Stage 3: If the grievant is not satisfied with the decision of CDC and project proponent or in absence of any response of its representatives, within 35 days of the complaint, the grievant, in his/her last resort, may submit its case to the court.

CDC= Compensation Determination Committee, PAPs= Project Affected Persons, GRC= Grievance Redress Committee, SC= Project Management and Supervision Consultant, DOR= Department of Roads, GESU= Geo-Environment and Social Unit. *Aggrieved person may also access the country's legal system at any stage (of the three stages) of the grievance redress mechanism.

8 Stakeholder Engagement and Public Consultations

Details of stakeholder consultations and feedback received from the stakeholders and actions taken or to be taken up by DOR to address their concerns are described in this chapter.

8.1 Project Stakeholders

The project stakeholders are categorized as:

Affected parties:

They include individuals, groups, and entities within the project's Corridor of Impact, which is set as the area within the 150 meters each side from the central line of the proposed road, that may be directly impacted by the project activities and/or have been identified as most susceptible to the change associated with the project. So, the project-affected parties need to be closely engaged in identifying impacts, as well as in decision-making on mitigation and management measures. They include:

- Local populations living or public service providers located within the area of 150 meters each side from the central line of the proposed road and may be adversely affected mainly by noise, dust, vibration, and the vehicular movements that will be used for the construction activities,
- Persons or households who may lose temporary or permanent access to land and/or will be restricted from accessing natural resources because of the project, e.g., farmers, landowners, informal settlers, forest user groups, etc.
- Local health centers that provide basic health supports to the project staff and migrant workers.

Interested Parties:

The interested parties in this project, other than those directly affected, include:

- Government officials (elected and non-elected), regulatory, and permit awarding agencies at the federal, provincial, and local levels, including environmental, technical, and labor authorities. E.g. Ministry of Forest and Environment
- Government officials at District level offices of key ministries, including Divisional Forest Offices, Road Offices, Survey Office, Land Revenue Offices, and Electricity Authority, etc.
- Non-elected officials with wide recognition within the community, such as headteachers of local schools, religious leaders, or leaders of local cooperatives
- Leaders of informal or traditional community institutions such as women groups, Dalits Samaj, water consumer groups, village councils, etc.
- NGOs and CBOs at national, provincial, and local levels on the welfare and rights of indigenous people and vulnerable groups such as Dalits and other minorities, gender/GBV issues, etc.
- Residents and communities within the project area that can benefit from increased economic opportunities, employment, and training opportunities stemming from the project; and,
- Media including district and local press clubs.

Disadvantaged/vulnerable individuals or groups:

The project recognizes the need to understand whether impacts may disproportionately fall on disadvantaged or vulnerable individuals or groups that are often unable to express their concerns or not in a position to react to the impacts due to various social barriers or may not even understand the impacts of a project. The vulnerability may stem from an individual's gender, race, age, health condition, ethnicity or caste, education and income levels and other elements of marginalization. The stakeholder engagement activities in this project will consider these elements of vulnerability and deploy strategies such as periodic disclosure of information in a way comprehensible to local communities and meaningful consultations in a culturally appropriate manner to ensure that the disadvantaged and vulnerable individuals fully understand the potential impacts and mitigation measures of the project. The project will also take special measures to ensure that disadvantaged and vulnerable groups have the opportunity to participate in accessing project benefits, provide feedback, and submit grievances. These groups may include and are not limited to the following:

- Physically-challenged and visually-impaired people
- Individuals with chronic diseases and pre-existing medical conditions
- Minority groups including Dalits and Muslims (see table 3.2 below)
- Indigenous peoples and groups
- Disaster-affected populations
- Poor households including homeless and landless families
- People/children with disabilities; and,
- School children especially in relation to safety in crossing roads

8.2 Consultation Meetings

consultations have carried out engagements with various key institutional and community stakeholders, including federal government ministries, provincial and municipal authorities, Divisional Forest Authorities, and Forest User Groups. Through these engagements, the government disclosed early project concepts and objectives and noted their ideas, suggestions, and concerns used to inform the project design. Details of consultation meetings are given in Table 8.1

Table 8.1: Details of Public Consultation Meetings

S.No.	Location	Date	Participants		
			Male	Female	Total
A	WARD and Municipal Level Consultations				
1	Butwal Sub-Metropolitan City	2022/01/13	5	3	8
2	Butwal Sub-Metropolitan City - Ward no. 1	2022/01/02	7	2	9
3	Butwal Sub-Metropolitan City - Ward no. 2	2022/01/11	5	3	8
4	Butwal Sub-Metropolitan City - Ward no. 12	2021/12/20	9	17	26

S.No.	Location	Date	Participants		
			Male	Female	Total
5	Butwal Sub-Metropolitan City - Ward no. 13	2021/12/21	14	5	19
6	Sainamaina Municipality	2022/01/11	4	1	5
7	Sainamaina Municipality – Ward no. 1	2021/12/21	8	6	14
8	Sainamaina Municipality – Ward no. 2	2022/01/10	14	1	15
9	Sainamaina Municipality – Ward no. 3	2021/12/19	10	6	16
10	Sainamaina Municipality – Ward no. 4	2021/01/18	18	4	22
11	Sainamaina Municipality – Ward no. 5	2021/12/17	8	3	11
12	Sainamaina Municipality – Ward no. 6	2021/12/30	19	2	21
13	Sainamaina Municipality – Ward no. 8	2021/12/29	17	3	20
14	Sainamaina Municipality – Ward no. 9	2021/12/31	21	3	24
15	Sainamaina Municipality – Ward 10	2021/12/28	10	5	15
16	Sainamaina Municipality – Ward 11	2021/12/28	12	1	13
17	Kanchan Rural Municipality	2022/01/11	8	2	10
18	Kanchan Rural Municipality – Ward 5		6	4	10
19	Banganga Municipality	2022/01/05	6	1	7
20	Banganga Municipality – Ward no. 1	2022/01/11	11	4	15
21	Banganga Municipality – Ward no. 2	2022/01/04	13	2	1
22	Banganga Municipality – Ward no. 4	2022/01/04	43	20	63
23	Banganga Municipality – Ward no. 7	2022/01/04	16	5	21
24	Banganga Municipality – Ward no. 8	2022/01/05	18	0	18
25	Buddhabhumi Municipality	2022/01/05	6	4	10
26	Buddhabhumi Municipality – Ward 2	2022/01/06	9	2	11
27	Buddhabhumi Municipality–Ward 4	2022/01/06	15	1	16
		TOTAL WARD-LEVEL	332	110	442
B	Environmental Agencies and NGOs				
28	Community Forest Groups in the Project Area	14 to 29 December 2021	31	6	37
29	Wildlife Conservation Nepal - Kathmandu	25 Oct 2021	3		3
30	Bird Conservation Nepal - Kathmandu	25 Oct 2021	1		1
31	Department of Forest /IEE/EIA Section, Kathmandu	27 Oct 2021	2		2
32	Sub Divisional Forest Office, Kanchan, Rupandehi district	14 Dec 2021	2		2

S.No.	Location	Date	Participants		
			Male	Female	Total
33	Sub Divisional Forest Office, Gorusinghe	14 Dec 2021	2		2
		GRAND TOTAL	373	116	489

8.3 Feedback from Consultations

Feedback from the consultations was overall supportive of the project from both local communities and the government agencies. The feedback from the consultations is summarized in Table 8.2.

Table 8.2: Feedback from Consultations

S.No.	Issues/Concerns/Demand	Response/ Action
1	Construction work to be carried out only after infrastructures like; water pipelines, electricity wires and poles, telecommunications wires, canals, drains etc., which exist along the roadside, to be managed and shifted accordingly after consulting with respective organizations. Also, there shouldn't be any hindrances in the water supply during the construction phase.	The mitigation measures will address these issues during implementation, and a sufficient budget will be allocated to resolve these issues in New design.
2	The facility of cross drainage management and replacement of old worn-out Hume pipes with new culverts to facilitate excess water flow.	The social and environmental report (mitigation measures) will address these issues during implementation, and a sufficient budget will be allocated to resolve these issues in the new design
3	Landslide prone area hence adequate study to be carried out before carrying out construction work.	The social and environmental report (mitigation measures) will address these issues during implementation and a sufficient budget will be allocated to resolve these issues in the new design
4	Should come up with ideal plan in regards of minimizing pollution during the construction phase of project.	The social and environmental report (mitigation measures) will address these issues during implementation, and a sufficient budget will be allocated to resolve these issues in the new design
5	Provision of overhead bridges (sky bridges) and underpass to reduce road accidents and easy access on either side.	The new design has made provisions to address these issues.
6	Construction to be carried out by dividing the entire road section into small parts which would help in reducing the pollution.	The new design has made sufficient provisions to address these issues/ Will discuss with the technical team if possible
7	Telephone and electricity wires to be undergrounded if possible.	The new design has made sufficient provisions to address these issues

S.No.	Issues/Concerns/Demand	Response/ Action
8	Different types of environmental pollution may generate as a result of various road construction activities (especially air pollution), which should be mitigated with appropriate measures. The bituminous road must be demolished at the end period to prevent air pollution.	Air pollution measures will apply, such as water sprinkling during the construction period;
9	The project should be sensitive to the occurrence of likely social distortion during road construction and should implement public awareness program.	Social and environmental awareness will be conducted during the implementation
10	The project should be started in coordination with the concerned agencies regarding the existing structures related to electricity, drinking water, telephone, sewerage, and irrigation.	It is necessary to coordinate with concerned agencies
11	Dust and smoke should be completely controlled during road construction.	The new design has made sufficient provisions to address these issues
12	Skill development programs related to livelihood should be conducted for the locals.	These issues will be addressed through RP.
13	Construction work to be carried out by adopting safety measures.	The new design has made sufficient provisions to address these issues
14	Local people from the project-affected settlement should be prioritized in terms of providing employment in the project on the basis of their skill, qualification, and capability.	The project document has provisions to resolve the issues.
15	The project should be sensitive to the occurrence of likely social distortion during road construction and should implement public awareness program.	Project documents have provisions to resolve the issues GRM will be established in each municipality to address the issues.
16	The project should be completed within a fixed period of time.	The donor and government have fixed the construction period.
17	Proper provisions of CCTV and traffic lights on the roads.	These issues will be discussed, technical team.
18	As there is Lumbini Sajedhari/Tilaurakot Collaborative Forest in this area, arrangements should be made to use the forest produce collected in Lumbini Sajedhari Forest.	Discussion will be done with Divisional Forest Office, local bodies and respective community forests
19	The project will have to reconstruct the Buddha statue, waiting for station and other structures near the Lumbini entrance gate within the road section.	RAP will address the issues. A sufficient budget will be allocated to reconstruct the affected structures.
20	Tree plantation arrangements should be made.	Cost for tree plantation/compensatory plantation will be allocated.
21	The project should help in controlling the floods with the proper provision of drains on either side of the road from Geruwa, Bangai to Koili Bridge.	The new design will address the issues.
22	As there is Mayadevi Stadium in the western part of Banganga Bridge and Shanti Udyan in the north, it should be properly managed and action plan should be made to maintain local identity and pride.	RAP will address the issues. A sufficient budget will be allocated to reconstruct the affected structures.

S.No.	Issues/Concerns/Demand	Response/ Action
23	When constructing roads between urban areas and settlements, certain types of pollution-preventing plants should be planted.	Ornamental tree/ shrub will be a plantation in green belt/median.
24	A powerful deity temple, Jhadulamai, lies along the roadside hence, construction work needs to be done with its preservation and protection.	We will discuss this with the technical team. These issues will be given priority
25	Barbed wire fence along roadside should be reconstructed by contractors after demolishing them	Damage by the project will be reinstated/ reconstructed included in the engineer's estimate
26	Ownership of harvested trees should be granted to respective forest user groups	The discussion will be done with Divisional Forest Office, local bodies and respective community forests
27	Construction of Gabion around high Embankment and unstable area and landslide prone areas	For the protection of embankment erosion, bio-engineering measures and civil structures will be constructed as per requirement
28	Roadside plantation should be restored after its removal for road extension	The issue will be addressed according to Forest Clearance Guidelines. (When 1 tree is felled, it should be replaced with 10 as compensatory plantations) the cost will be allocated
29	Construction of wildlife corridor for easy wildlife passage on both side of road	Certain measures will be applied in the forest area such as warning signs of wildlife crossing, speed limit sign, display board
30	Construction of sewage channel to prevent water flooding in residential areas	Side drain provision is the road design
31	Construction of pavements to connect roadway with major picnic spot	This issue will be discussed with the technical team for incorporation project cost.
32	Construction of wildlife corridor for easy wildlife passage on both side of road	Certain measures will be applied in the forest area such as warning signs of wildlife crossing, speed limit sign, display board
33	Construction of sewage channel to prevent water flooding in residential areas	Side drain provision is the road design
34	Construction of pavements to connect roadway with major picnic spot	This issue will be discussed with the technical team for incorporation project cost.
35	Filling material required for road construction should not be extracted from the community forests	Filling material will not be taken from the community forest area
36	Land stabilization activities should be done in Chure region considering its senility during excavation	This issue will be discussed with the technical team for incorporation project cost.
37	Need to prepare cross drainage structure (Box culvert, bridge) wildlife friendly in Jungle area height and width, and need certain interval	If any location is identified, the issue will be addressed
38	Gaida lake is near the project area there is Vulture restaurant	It will be studies during environmental assessment

S.No.	Issues/Concerns/Demand	Response/ Action
39	For removal of roadside tree need to follow Government trees clearance criteria 2071 (2014 AD) (Number 4 and 10) It is national Priority project or not For compensatory plantation need to follow 1:10, compensatory cost need to include in project cost Recommendation letters is necessary Divisional Forest Office	We review the Government tree clearance criteria 2071 (Numbers 4 and 10). It is a national priority project; Project will include the compensatory cost in project cost. A letter will be collected from DFO during IEE
40	Take all trees from ROW, using GPS coordinate, diameter and height We will support for census survey if required. Compensatory cost to be included in project cost	The survey team will take GPS coordinate, diameter and height of all trees The compensatory cost will be included in the ESIA/project cost
41	Take all trees from ROW, using GPS coordinate, diameter and height Compensatory cost to be included in project cost	The survey team will take GPS coordinate, diameter and height of all trees The compensatory cost will be included in the ESIA/project cost

8.4 Access to Information

This ESIA and Executive Summary of ESIA will be disclosed on the DRO website and will be sent to the World Bank for disclosure on its external website. The ESIA summary in Nepali will also be uploaded into the DRO's website.

Annex 1: Methodology of Biological Survey and List of Species In the Project Area

Study Methods

The study methodology opted, field based direct observation and secondary information collection method i.e. literatures review and public consultation throughout the wildlife-biodiversity study. Varied approaches were applied within direct observation method specific to Mammals, Aves, Herpetofauna and Fish biodiversity. The study was undertaken from December 20, 2021 to January 11, 2022. The study methods applied are as follow:

Mammal

The mammal species presence and impact study in the project zone of influence was carried applying approaches of i) Surveying animal tracks on the roadside and direct observation; ii) road kill survey and iii) analysis of animal movements, such as road avoidance, barrier effect and increased overlapping of home ranges (Smith and Ree, 2015). Considering the 2 kilometer distance alongside the road as the Ecologically Appropriate Area of Analysis (EAAA) with higher possibilities of wildlife movement the highway to and from, the grid size of 2 Km x 2 Km is created through the application of Geographic Information System (QGIS v. 3.10.9) (Figure 1). Due to insignificant number of prior studies of the area therewith less information was available on mammal species, Direct Impact Area was thus increased to 300m (150m on either side) as has already been tested in the Environment Impact Assessment of Kamala Dhalkebar Pathlaiya Section of MRM (ERMC 2020) for critical habitat screening.

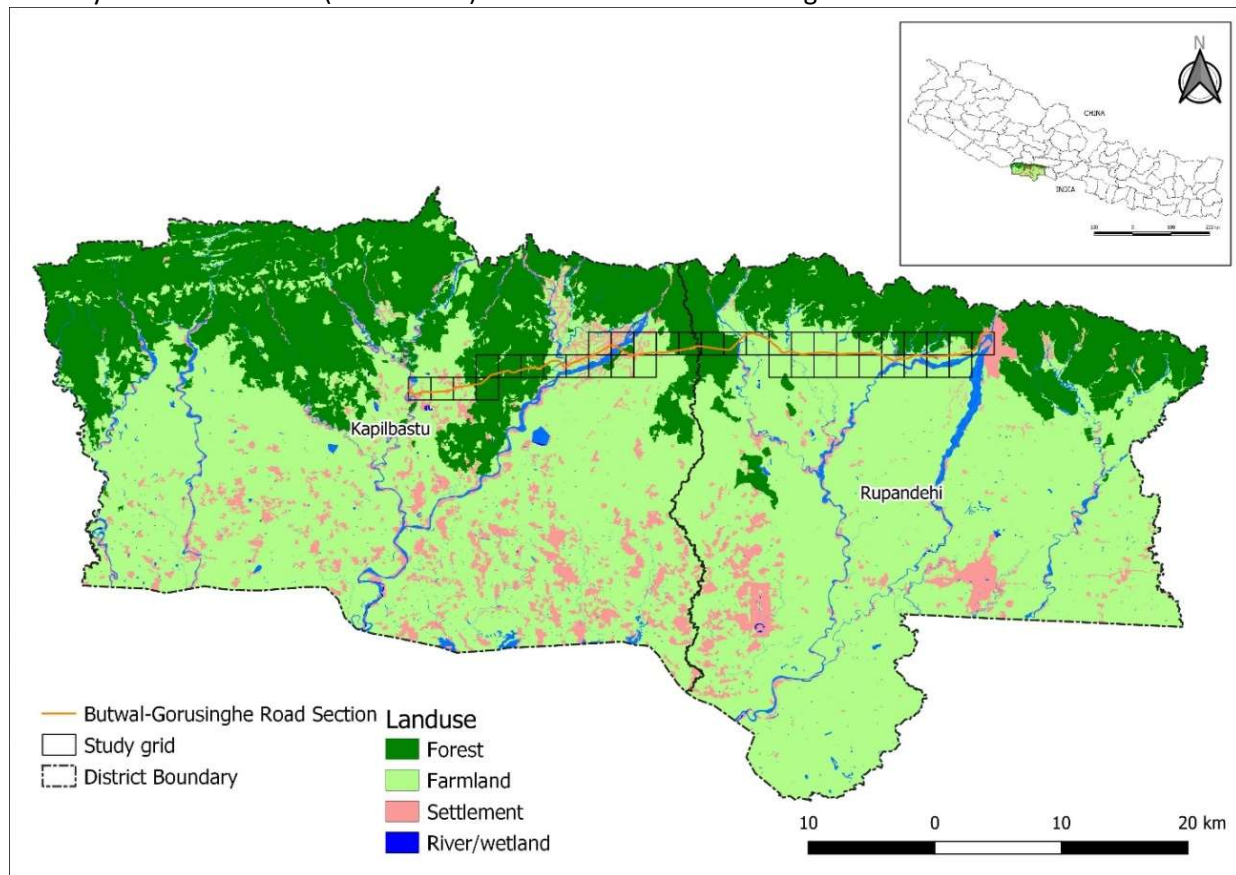


Figure 1: Mammal Survey Grids (2 Km x 2 Km)

Sign survey such as; pugmark/footprint/hoof mark, scats/pellets/dung, scratch on the tree trunks were thoroughly conducted in designated Direct Impact Area. Direct observation was conducted within 2km x 2km grid. Road kill survey was carried sequentially after sign survey. The mammal's presence record in the project area are listed referring "The Status of Nepal's Mammals: The Red List Series" (Jnawali et al, 2011). Addition to the field study, Forest officials (Division Forest and Sub-division Forest Offices), Local Forest Management Groups (Community Forest User Group, Collaborative Forest Management Groups, Religious Forest Management Groups) and other stakeholders were consulted for the better understanding wildlife relating points. Such as:

- Wildlife species in community forest (mammals, avifauna, herpetofauna and fish species)
- Human-Wildlife Conflict (intensity, causes and reduction measures)
- Wildlife road crossing spots, intensity wildlife strike/collision and kill (Black spots) and road kill avoidance measures
- Community Forest initiative for wildlife management and habitat restoration, challenges, lacking and way forth
 - Fodder species plantation
 - Hunting and poaching
 - Water hole/ Pond construction
- Opportunity and support hunting
- Knowledge on wildlife corridor

Avifauna

For Avifauna study, line transects method was used with unlimited radius to record all heard or seen birds (Bibby et al, 2000). Bird monitoring was done along the highways as well as visiting nearby forests. The walking speed was ~1km per hour. Transect walk was carried in the grid designed for the mammal study (figure 3). Bird observations were conducted from 7:00am to 6:30 pm in evening with some breaks in the afternoon. Opticor Binoculars of 10x42 and Canon 90D with 55-250mm lens were used to locate and photograph birds respectively. Identification of birds were carried following and Birds of Nepal (Grimmett et al, 2016). Migratory pattern and global status each species was noted following the IUCN Redlist (IUCN, 2021). Similarly, National status was noted following National Redlist of Birds (Inskipp et al, 2016).

Herpetofauna

Capture and Release method applied for sample collection herpetofauna. Frogs and toads were captured using Insect Mesh Net for short span and released back after taking photographs for further identification process. While in the case of reptiles, photographs of directly observed creatures during survey taken for its identification. "Herpetofauna of Nepal-A Conservation Companion". For Turtles followed "Turtles of Nepal: A Field Guide for Species Accounts and Distribution" (Aryal, P.C. *et al.*, 2010) were followed for herpetofauna identification.



Wild boar bath



Indian crested porcupine quills



Pellets of Sambar



Pellet of Barking deer



Mongoose Footprint (left) and Scat (right)

Fish

Butwal-Gorusinghe road segment pass primarily through settlements and farmland while pass across limited rivers (2) with annual flow while other are ephemeral streams such as Kothi Khola, Kaila Khola, Balbagadevi Khola, Kanchan Khola that are considered for fish study.

Net fishing and indigenous ways of fishing (trapping and angling) used for fish sample collection with the help of local anglers. Fish species identified following “Ichthyology of Nepal-A Study of Fishes of the Himalayan Water” and “Fish, Fisheries and Farmers in Nepal”. Consultation with experts made for precision in Identification of species. Institutional Animal Care and Use Committee and Animal Welfare Act referred for humane collection of samples.

Table 1: Observed avifauna in the project area during the field Survey

S.N	Common Name	Scientific Name	Conservation Status		CITES	Movement Pattern
			Global	National		
1	Alexandrine Parakeet	<i>Palaeornis eupataria</i>	NT	NT	II	Nomadic
2	Ashy Prinia	<i>Prinia socialis</i>	LC			Not a Migrant
3	Asian Pied Starling	<i>Gracupica contra</i>	LC			
4	Besra	<i>Accipiter virgatus</i>	LC		II	Altitudinal Migrant
5	Black Bulbul	<i>Hypsipetes leucocephalus</i>	LC			Full Migrant
6	Black Drongo	<i>Dicrurus macrocercus</i>	LC			Full Migrant
7	Black Kite	<i>Milvus migrans</i>	LC		II	Full Migrant
8	Black Redstart	<i>Phoenicurus ochruros</i>	LC			Full Migrant
9	Black-hooded Oriole	<i>Oriolus xanthornus</i>	LC			Not a Migrant
10	Black-winged Cuckooshrike	<i>Lalage melascistos</i>	LC			Full Migrant
11	Black-winged Kite	<i>Elanus caeruleus</i>	LC		II	Not a Migrant
12	Blue Whistling Thrush	<i>Myophonus caeruleus</i>	LC			Altitudinal Migrant
13	Blue-throated Barbet	<i>Psilopogon asiaticus</i>	LC			Not a Migrant
14	Cattle Egret	<i>Bubulcus ibis</i>	LC			Full Migrant
15	Chestnut-shouldered Bush-sparrow	<i>Gymnoris xanthocollis</i>	LC			Not a Migrant
16	Chestnut-tailed Starling	<i>Sturnia malabarica</i>	LC			Not a Migrant
17	Great Tit	<i>Parus major</i>	LC			Not a Migrant
18	Common Hawk Cuckoo	<i>Hierococcys varius</i>	LC			Full Migrant
19	Common Iora	<i>Aegithina tiphia</i>	LC			Not a Migrant
20	Common Myna	<i>Acridotheres tristis</i>	LC			Not a Migrant
21	Rock Dove	<i>Columba livia</i>	LC			Not a Migrant

22	Common Stonechat	<i>Saxicola Torquatos</i>	LC			Full Migrant
23	Common Tailorbird	<i>Orthotomus sutorius</i>	LC			Not a Migrant
24	Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	LC			Not a Migrant
25	Crested Bunting	<i>Emberiza lathami</i>	LC			Altitudinal Migrant
26	Crested Serpent Eagle	<i>Spilornis cheela</i>	LC		II	Not a Migrant
27	Crimson Sunbird	<i>Aethpyga siparaja</i>	LC			Not a Migrant
28	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	LC			Not a Migrant
29	Eurasian Tree Sparrow	<i>Passer montanus</i>	LC			Not a Migrant
30	Golden-fronted Leafbird	<i>Chloropsis aurifrons</i>	LC			Not a Migrant
31	Greater Coucal	<i>Centropus sinensis</i>	LC			Not a Migrant
32	Greater Racquet-tailed Drongo	<i>Dicrurus paradiseus</i>	LC			Not a Migrant
33	Asian Green Bee-eater	<i>Merops orientalis</i>	LC			Full Migrant
34	Green Sandpiper	<i>Tringa ochropus</i>	LC			Full Migrant
35	Greenish Warbler	<i>Phylloscopus trochiloides</i>	LC			Full Migrant
36	Grey-breasted Prinia	<i>Prinia hodgsonii</i>	LC			Altitudinal Migrant
37	Grey-hooded Warbler	<i>Phylloscopus xanthoschistos</i>	LC			Not a Migrant
38	Hair-crested Drongo	<i>Dicrurus hottentottus</i>	LC			Full Migrant
39	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>	LC			Full Migrant
40	Himalayan Griffon	<i>Gyps himalayensis</i>	NT	VU	II	Full Migrant
41	House Sparrow	<i>Passer domesticus</i>	LC			Not a Migrant
42	Indian Grey Hornbill	<i>Ocyrceros birostris</i>	LC			Not a Migrant
43	Indian Peafowl	<i>Pavo Cristatus</i>	LC	NT	III	Not a Migrant
44	Indian Pond Heron	<i>Ardeola grayii</i>	LC			Not a Migrant
45	Indian Roller	<i>Coracias benghalensis</i>	LC			Not a Migrant
46	Jungle Babbler	<i>Turdoides striata</i>	LC			Not a Migrant
47	Jungle Owlet	<i>Glaucidium radiatum</i>	LC		II	Not a Migrant
48	Indian Cuckooshrike	<i>Coracina macei</i>	LC			Not a Migrant
49	Large Woodshrike	<i>Tephrodornis variegatus</i>	LC			Altitudinal Migrant
50	Large-billed Crow	<i>Corvus macrorhynchos</i>	LC			Not a Migrant
51	Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	VU		Full Migrant

52	Black-rumped Flameback	<i>Dinopium benghalense</i>	LC			Not a Migrant
53	Little Cormorant	<i>Microcarbo niger</i>	LC			Not a Migrant
54	Little Egret	<i>Egretta garzetta</i>	LC			Full Migrant
55	Little Ringed Plover	<i>Charadrius dubius</i>	LC			Full Migrant
56	Long-tailed Shrike	<i>Lanius schach</i>	LC			Full Migrant
57	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	LC		II	Full Migrant
58	Oriental Magpie-robin	<i>copsychus saularis</i>	LC			Not a Migrant
59	Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	LC	NT	II	Not a Migrant
60	Indian White-eye	<i>Zosterops palpebrosus</i>	LC			
61	Paddyfield Pipit	<i>Anthus rufulus</i>	LC			Not a Migrant
62	Pale-billed Flowerpecker	<i>Dicaeum erythrorhynchos</i>	LC			Not a Migrant
63	Pied Bushchat	<i>Saxicola caprata</i>	LC			Full Migrant
64	Plain Prinia	<i>Prinia inornata</i>	LC			Altitudinal Migrant
65	Plum-headed Parakeet	<i>Himalayapsitta cyanocephala</i>	LC		II	Not a Migrant
66	Purple Sunbird	<i>Cinnyris asiaticus</i>	LC			Not a Migrant
67	Red Avadavat	<i>Amandava amandava</i>	LC			Not a Migrant
68	Red Junglefowl	<i>Gallus gallus</i>	LC			Not a Migrant
69	Red-billed Blue Magpie	<i>Urocissa erythrorhynchos</i>	LC			Altitudinal Migrant
70	Red-headed Vulture	<i>Sarcogyps calvus</i>	CR	EN	II	Not a Migrant
71	Red-naped Ibis	<i>Pseudibis papillosa</i>	LC			Not a Migrant
72	Red-rumped Swallow	<i>Cecropis daurica</i>	LC			Full Migrant
73	Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC			Not a Migrant
74	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC			Not a Migrant
75	Rose-ringed Parakeet	<i>Alexandrinus krameri</i>	LC			Not a Migrant
76	Ruddy Shelduck	<i>Tadorna ferruginea</i>	LC	NT		Full Migrant
77	Rufous Treepie	<i>Dendrocitta vagabunda</i>	LC			Not a Migrant
78	Rufous Woodpecker	<i>Micropternus brachyurus</i>	LC			Not a Migrant
79	Rusty-cheeked Scimitar-babbler	<i>Erythrogonys erythrogonys</i>	LC			Not a Migrant
80	Scarlet Minivet	<i>Pericrocotus flammeus</i>	LC			Not a Migrant
81	Shikra	<i>Accipiter badius</i>	LC		II	Full Migrant
82	Slaty-headed Parakeet	<i>Himalayapsitta himalayana</i>	LC		II	Nomadic

83	Slender-billed Vulture	<i>Gyps tenuirostris</i>	CR	CR	II	Not a Migrant
84	Western Spotted Dove	<i>Spilopelia suratensis</i>	LC			Full Migrant
85	Steppe Eagle	<i>Aquila nipalensis</i>	EN	VU	II	Full Migrant
86	Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	LC			Not a Migrant
87	Verditer Flycatcher	<i>Eumyias thalassinus</i>	LC			Full Migrant
88	White-bellied Drongo	<i>Dicrucus caerulescens</i>	LC			Not a Migrant
89	White-bellied Redstart	<i>Hodgsonius phaenicuroides</i>	LC			Altitudinal Migrant
90	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	LC			Not a Migrant
91	White-rumped Vulture	<i>Gyps bengalensis</i>	CR	CR	II	Not a Migrant
92	White-throated Kingfisher	<i>Halcyon gularis</i>	LC			Not a Migrant
93	Zitting Cisticola	<i>Cisticola juncidis</i>	LC			Not a Migrant

Table 2. Herpetofauna species observed and present in the project site

S.N	Common Name	Species Name	Conservation Status		CITES	National Protection Status	Reference
			Global	National			
Frog and Toads							
1	Black-spined Toad	<i>Duttaphrynus melanostictus</i>	LC				Shah and Tiwari, 2004
2	Marbled Toad	<i>Duttaphrynus stomaticus</i>	LC				Shah and Tiwari, 2004
3	Skittering frog	<i>Euphlyctis cynoplyctis</i>	LC				Observed
4	Indian bull frog	<i>Hoplobatrachus tigerinus</i>	LC		II		Observed
5	Bhamo frog	<i>Humerana humeralis</i>	LC				Shah and Tiwari, 2004
6	Teipeh frog	<i>Hylarana tytleri</i>	LC				Shah and Tiwari, 2004
7	Indian burrowing frog	<i>Sphaerotheca breviceps</i>	LC				Shah and Tiwari, 2004
8	Maskey's burrowing frog	<i>Sphaerotheca maskeyi</i>	LC				Shah and Tiwari, 2004
9	Common Indian tree frog	<i>Polypedates maculatus</i>	LC				Observed
Skinks, Geckos and Lizards							

10	Common garden lizard	<i>Calotes versicolor versicolor</i>					Observed
11	Himalayan rock lizard	<i>Laudakia tuberculata</i>					Observed
12	Nepalese Fan-throated lizard	<i>Sitana sivalensis</i>					Shah and Tiwari, 2004
13	Sikkim skink	<i>Scincella sikimmensis</i>					Shah and Tiwari, 2004
14	Brahminy skink	<i>Mabuya carinata</i>					Shah and Tiwari, 2004
15	Striped grass skink	<i>Mabuya dissimilis</i>					Shah and Tiwari, 2004
16	Bronze grass skink	<i>Mabuya macularia macularia</i>					Shah and Tiwari, 2004
17	Spotted litter skink	<i>Sphenomorphus maculatus</i>					Shah and Tiwari, 2004
18	Bengal monitor	<i>Varanus bengalensis</i>	LC		I		Shah and Tiwari, 2004
19	Golden monitor	<i>Varanus flavescens</i>	LC		I	Protected	Shah and Tiwari, 2004
Snakes and Python							
20	Common blind snake	<i>Rhamphotyphlops braminus</i>					Shah and Tiwari, 2004
21	Burmese python	<i>Python molurus bivittatus</i>	VU		II		Shah and Tiwari, 2004
22	Common vine snake	<i>Ahaetulla nasuta</i>					Shah and Tiwari, 2004
23	Buff-striped keelback	<i>Amphiesma stolatum</i>					Shah and Tiwari, 2004
24	Olive keelback water snake	<i>Atretium schistosum</i>	LC				Shah and Tiwari, 2004
25	Forsten's cat snake	<i>Boiga forsteni</i>	LC				Shah and Tiwari, 2004
26	Common cat snake	<i>Boiga trigonata trigonata</i>					Shah and Tiwari, 2004
27	Common bronze backed tree snake	<i>Dendrelaphis tristis</i>					Shah and Tiwari, 2004
28	Mock Viper	<i>Psammodynastes pulverulentus</i>					Shah and Tiwari, 2004
29	Common rat snake	<i>Ptyas mucosus</i>			II		Shah and Tiwari, 2004
30	Cantor's black-headed snake	<i>Sibynophis sagittaria</i>					Shah and Tiwari, 2004

31	Dark-bellied marsh snake	<i>Xenochrophis cerasogaster</i>					Shah and Tiwari, 2004
32	Yellow spotted keelback	<i>Xenochrophis fravipunctatus</i>					Shah and Tiwari, 2004
33	Chequered keelback	<i>Xenochrophis piscator</i>					Shah and Tiwari, 2004
34	Common Krait	<i>Bungarus caeruleus</i>					Shah and Tiwari, 2004
35	Banded krait	<i>Bungarus fasciatus</i>	LC				Shah and Tiwari, 2004
36	Monocellate cobra	<i>Naja kaouthia</i>	LC		II		Shah and Tiwari, 2004
37	Spectacled cobra	<i>Naja naja</i>	LC				Shah and Tiwari, 2004
38	King cobra	<i>Ophiophagus hannah</i>	VU		II		Shah and Tiwari, 2004
39	Russell's viper	<i>Daboia russelii russelii</i>	LC		III		Shah and Tiwari, 2004
Turtle and Tortoise							
40	Tricarinate hill turtle	<i>Melanochelys tricarinata</i>	EN	VU	I		Aryal et al., 2010
41	Black pond turtle	<i>Melanochelys trijuga indopeninsularis</i>	NT	Susceptible	II		Aryal et al., 2010
42	Indian eyed turtle	<i>Morenia petersi</i>	EN	Susceptible	II		Aryal et al., 2010
43	Indian tent turtle	<i>Pangshura tecta</i>	LC	Susceptible	I		Aryal et al., 2010
44	Elongated tortoise	<i>Indotestudo elongata</i>	CR	Susceptible	II		Aryal et al., 2010
45	Indian softshell turtle	<i>Aspideretes gangeticus</i>	EN	VU	I		Aryal et al., 2010
46	Indian peacock softshell turtle	<i>Aspideretes hurum</i>	VU	Susceptible	I		Aryal et al., 2010
47	Indian flapshell turtle	<i>Lissemys punctata andersoni</i>	LC	Susceptible	II		Aryal et al., 2010

Table 3: Fish species of the project area

S.N	Common Name	Species Name	Conservation Status		CITES	Reference
			Global	National		
1	Reba carp	<i>Cirrhinus reba</i>	LC	Uncommon		Cited
2	Kalbasu	<i>Labeo calbasu</i>	LC	Common		Cited
3	Cooper mahseer	<i>Neolissocheilus hexagonalepis</i>	LC	Vulnerable		Observed

4	Tor mahseer	<i>Tor tor</i>	DD	Endangered		Cited
5	Silver razor belly minnow	<i>Salmostoma acinaces</i>	LC	Common		Cited
6	Barred baril	<i>Barilius barila</i>	LC	Common		Cited
7	Hamilton's baril	<i>Barilius bendelisis</i>	LC	Common		Cited
8	Annandale garra	<i>Garra annandalei</i>	LC	Uncommon		Cited
9	Gotyla	<i>Garra gotyla gotyla</i>	LC	Common		Observed
10	Asiatic snakehead	<i>Channa gachua</i>	LC	Common		Observed
11	Walking catfish	<i>Clarias batrachus</i>	LC	Common		Observed
12	Spotfin swamp barb	<i>Punctius sophore</i>	LC	Rare		Observed
13	Spotted snakehead	<i>Channa punctatus</i>	LC	Common		Observed
14	Stinging catfish	<i>Heteropneustes fossilis</i>	LC	Common		Observed



Asiatic snakehead



Spotted snakehead



Spotfin swamp barb



Stinging Catfish



Walking catfish



Gotyla

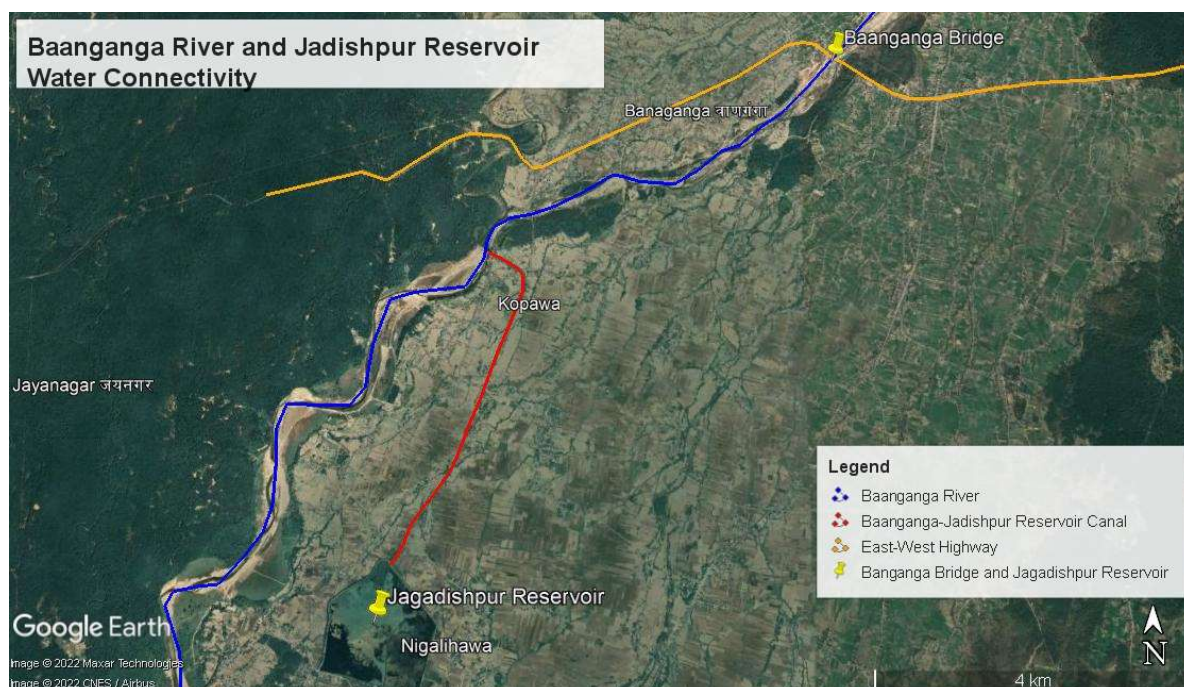


Figure 6: Baanganga- Jadishpur Reservoir Water Connectivity

Table 7: Important IBAs of Nepal identified through IBAT

1	Annapurna Conservation Area	A1, A2, A3	NP001
2	Barandabhar forests and wetlands	A1, A3, A4i	NP002
3	Bardia National Park	A1, A3, A4i	NP003
4	Chitwan National Park	A1, A3, A4i	NP004
5	Dang Deukhuri foothill forests and west Rapti wetlands	A1, A3	NP005
6	Dharan forests	A1, A2, A3, A4i	NP006
7	Dhorpatan Hunting Reserve	A1, A2, A3	NP007
8	Ghodaghodi Lake	A1, A3, A4i	NP008
9	Kanchenjunga Conservation Area	A1, A2, A3	NP010
10	Khaptad National Park	A1, A2, A3	NP011
11	Langtang National Park	A1, A2, A3	NP013
12	Mai Valley forests	A1, A2, A3	NP015
13	Makalu Barun National Park	A1, A2, A3	NP016
14	Nawalparasi forests	A1	NP017
15	Parsa Wildlife Reserve	A1, A3	NP018
16	Phulchoki Mountain forests	A2, A3	NP019

17	Rampur valley	A1	NP020
18	Rara National Park	A1, A2, A3	NP021
19	Sagarmatha National Park	A1, A3	NP022
20	Shey-Phoksundo National Park	A1, A2, A3	NP023
21	Shivapuri-Nagarjun National Park	A2, A3	NP024
22	Sukla Phanta Wildlife Reserve	A1, A3, A4i	NP025
23	Tamur valley and watershed	A2, A3	NP026
24	Urlabari forest groves	A1, A4i	NP027
25	Farmlands in Lumbini area	A1, A3, A4i	NP014
26	Jagdishpur Reservoir	A1, A4i, A4ii	NP009
27	Koshi Tappu Wildlife Reserve and Koshi Barrage	A1, A3, A4i, A4iii	NP012